2014 Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d)

Groundwater Assessment

Table of Contents

SUMMARY

Texas' major and minor aquifers underlie approximately 76 percent of the state's surface area of 267,338 square miles (TWDB, 1995). Major aquifers are defined as producing large quantities of water in a comparatively large area of the state, whereas minor aquifers produce significant quantities of water within smaller geographic areas or small quantities in large geographic areas. Minor aquifers are very important as they may constitute the only significant source of water supply in some regions of the state. In 2008, these aquifers supplied 9.6 million acre-feet of groundwater, or about 60%, of all the water used by Texans for domestic, municipal, industrial, and agricultural purposes.

In 1989, the 71st Texas Legislature created the Texas Groundwater Protection Committee (Committee or TGPC) as a means to bridge the gap between existing state groundwater programs and to optimize water quality protection by improving coordination among agencies involved in groundwater activities. The Texas Commission on Environmental Quality (TCEQ) is designated as the lead agency of the TGPC. The Texas Water Development Board (TWDB) is designated as vice-chair of the Committee, and other members include as specified in the Texas Water Code, the Railroad Commission of Texas (RRC), Texas Department of State Health Services, Texas Department of Agriculture, Texas State Soil and Water Conservation Board, Texas Alliance of Groundwater Districts, Texas A&M AgriLife Research, the Bureau of Economic Geology, and Texas Department of Licensing and Regulation.

TGPC member agencies provide data for the TGPC's groundwater quality inventory efforts. In 1996, the TGPC, through the partnership of two of its member agencies, the TCEQ and the TWDB, began this process by performing an inventory of the groundwater quality of one major, one minor, and two of Texas' local aquifer systems. This information was published in the TCEQ's State of Texas Water Quality Inventory 1996, addressing both surface water and groundwater quality (TCEQ, 1996). Additional aquifers were included in the report's subsequent years, and this edition also marks the completion of the inventory for all thirty of the state's major and minor aquifers.

Information obtained from another of the Committee's reports, the annual *Joint Groundwater Monitoring and Contamination Report*, provides data on the "detrimental alteration of the naturally occurring physical, thermal, chemical, or biological quality of groundwater reasonably suspected of having been caused by the activities of entities under the jurisdiction of TGPC member agencies with groundwater protection responsibilities", which is Texas legislature's definition of contamination.

There were 3,627 documented groundwater contamination cases addressed in the 2012 (most recently published) joint report. Approximately 87 percent of the reported cases were under the jurisdiction of the TCEQ. The remainders of the cases were under the jurisdiction of the RRC and one groundwater conservation district which is a member of the Texas Alliance of Groundwater Districts. The vast majority of the cases documented under the jurisdiction of the TCEQ were identified through regulatory compliance monitoring, while the cases under the jurisdiction of the RRC and the groundwater conservation districts were

identified from special studies, investigations in response to complaints, or ambient groundwater quality monitoring activities (TGPC, 2012).

The most common contaminants reported in 2012 included gasoline, diesel, and other petroleum products, due to the large number of petroleum storage tank related cases in this report. Less common contaminants included volatile organic compounds (such as benzene, toluene, xylene, phenol, trichloroethylene, carbon tetrachloride, dichloroethylene, and naphthalene), pesticides (such as alachlor, atrazine, bromacil, dicamba, and prometon), creosote constituents, solvents, heavy metals, and sodium chloride (TGPC, 2012).

The 2014 groundwater inventory efforts show that ambient groundwater quality in Texas varies among the thirty study aquifers, but is generally good, with maximum contaminant level (MCL) exceedances occurring for some parameters (nitrate, sulfate, total dissolved solids, or others) in groundwater taken from a small percentage of water wells sampled throughout Texas. Fluoride (naturally occurring) appears as a secondary contaminant of concern sporadically throughout the wells sampled.

Groundwater contamination at regulated facilities occurs principally in heavily populated areas of the state, such as Houston, Dallas, Fort Worth, San Antonio and El Paso, primarily at petroleum storage tank facilities. Staff analysis of the geographic data for the joint report suggested that a high concentration of regulated surface activity sites with groundwater contamination does not correlate with area-wide ambient groundwater degradation. This is understandable, given that contamination from most regulated surface activities tends to impact shallow, local water bearing zones that are separated from the major and minor aquifers.

OVERVIEW – GROUNDWATER RESOURCES

In 2008, Texans used 16.1 million acre-feet of water. Groundwater, a fundamental component of the state's water resources, supplied 9.6 million acre-feet, or about 60% of all the water used by Texans for domestic, municipal, industrial, and agricultural purposes.

The groundwater used by Texans is produced primarily from aquifers, underground layers of rock with water stored in pore spaces, cracks or voids. Major aquifers are defined as producing large quantities of water in a comparatively large area of the state, whereas minor aquifers produce significant quantities of water within smaller geographic areas or small quantities in large geographic areas. Minor aquifers are very important as they may constitute the only significant source of water supply in some regions of the state. The major and minor aquifers are composed of many rock types, including limestones, dolomites, sandstones, gypsum, alluvial gravels, and in some parts of the state, igneous rocks.

The nine major aquifers include the Carrizo-Wilcox aquifer, the Pecos Valley aquifer, the Edwards - Balcones Fault Zone aquifer, the Edwards-Trinity (Plateau) aquifer, the Gulf Coast aquifer, the Hueco-Mesilla Bolson, the Ogallala aquifer, the Seymour aquifer, and the Trinity aquifer. (Fig. 1)

The twenty-one minor aquifers that have been delineated within the state include the Blaine aquifer, the Blossom aquifer, the Bone Spring/Victorio Peak aquifer, the Brazos River Alluvium, the Capitan Reef Complex, the Dockum aquifer, the Ellenburger-San Saba aquifer, the Edwards-Trinity (High-Plains) aquifer, the Hickory aquifer, a group of igneous rocks in West Texas referred to as simply "Igneous", the Lipan aquifer, the Marble Falls aquifer, the Marathon aquifer, the Nacatoch aquifer, the Queen-City aquifer, the Rita Blanca aquifer, the Rustler aquifer, the Sparta aquifer, the West Texas Bolsons, the Woodbine aquifer, and the Yegua-Jackson aquifer. (Fig. 2)

Together, these major and minor aquifers underlie approximately 76 percent of the state's surface area of 267,338 square miles (TWDB, 1995). Other undifferentiated, local aquifers may represent the only source of groundwater where major or minor aquifers are absent. These local aquifers, which provide groundwater that is used for all purposes, vary in extent from very small to several hundred square miles (TWC, 1989).

Groundwater quality of these smaller groundwater sources is not directly addressed in this report, as they are too small and numerous to be characterized within the scope of this document.

About 80 percent of the groundwater used in 2008 was for irrigation, with the remainder being used for municipal supplies, rural and municipal domestic consumption, rural livestock, electric utility, and industry. Municipalities used about 15 percent of all groundwater. Groundwater also provides a significant amount of the base flow for the state's rivers and streams, and is, therefore, of key importance to the maintenance of the state's environment and economy.

Figure 1. Major Aquifers of Texas

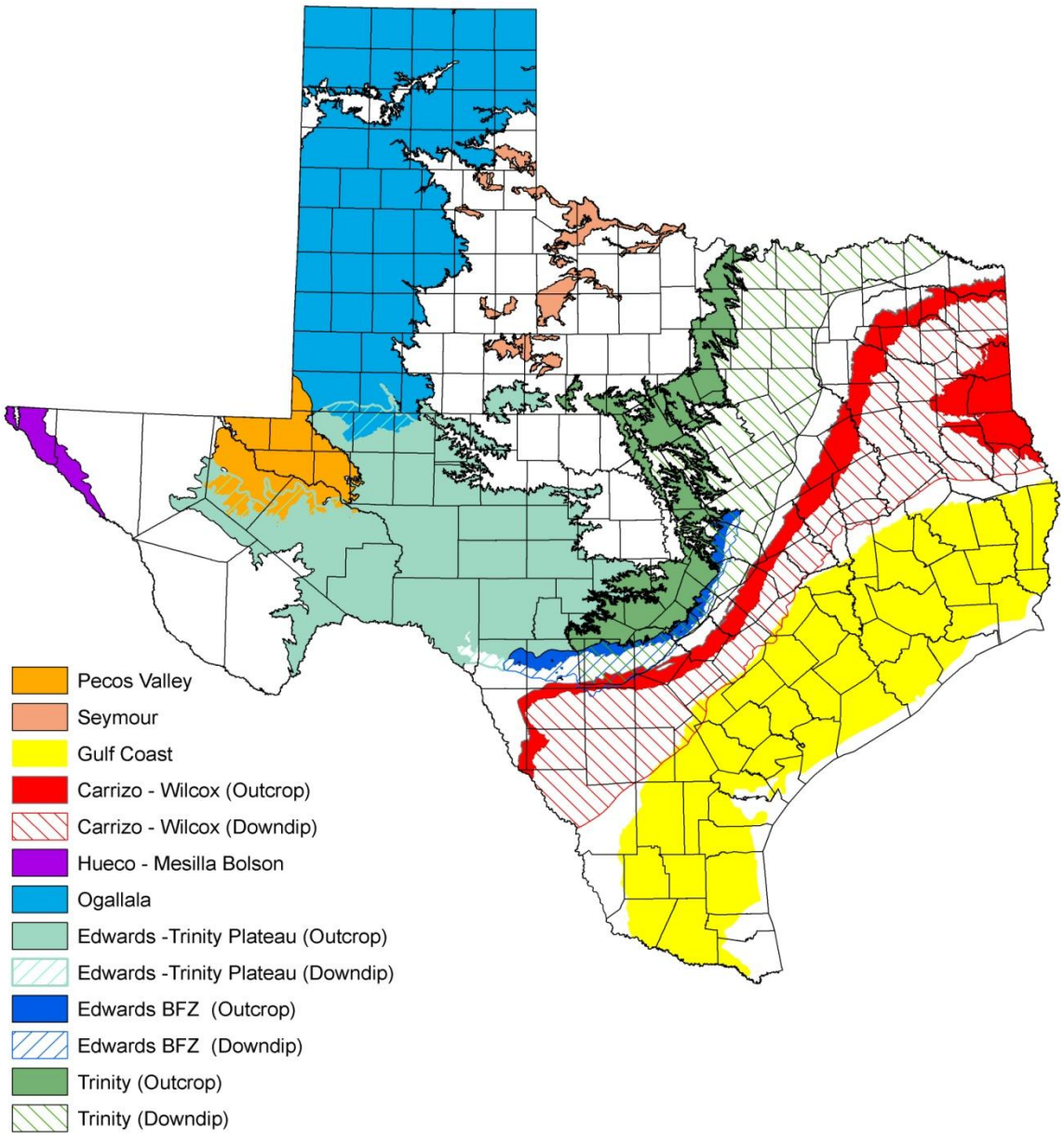
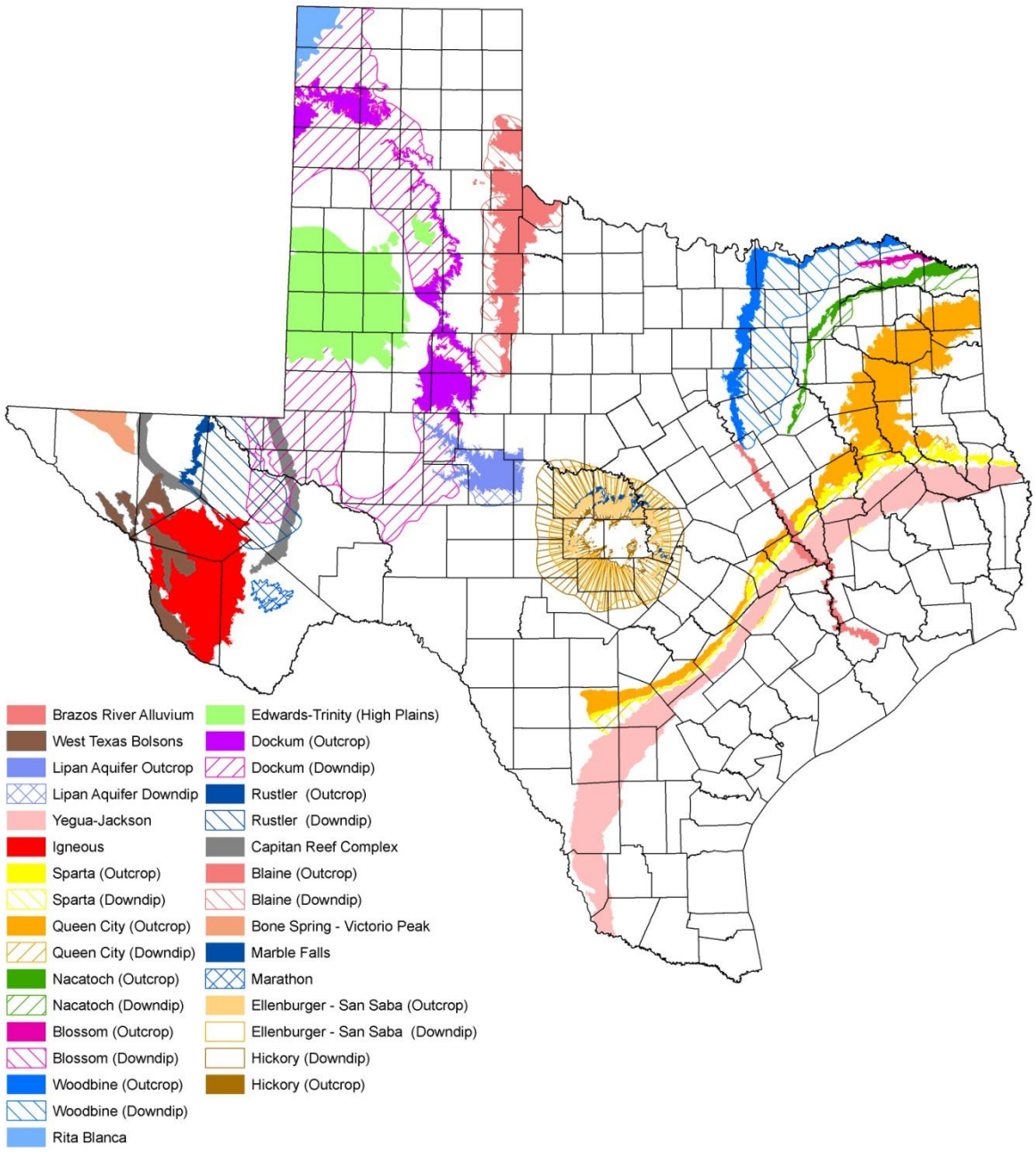


Figure 2. Minor Aquifers of Texas



GROUNDWATER PROTECTION

Texas Groundwater Protection Committee

The Texas Groundwater Protection Committee was created by the 71st Texas Legislature in 1989 as a means to bridge gaps between existing state groundwater programs and to optimize water-quality protection by improving coordination among agencies involved in groundwater activities. State law codified in Texas Water Code (TWC) §§26.401 through 26.408 established the TGPC; outlined the TGPC's powers, duties, and responsibilities; and established the state's groundwater protection policy.

The TGPC actively identifies opportunities to improve existing groundwater quality programs and promotes coordination between agencies. The TGPC also strives to improve or identify areas where new or existing programs could be enhanced to provide added protection. Major responsibilities of the TGPC are to:

- develop and update a comprehensive groundwater protection strategy for the state;
- study and recommend to the Legislature groundwater protection programs for areas in which groundwater is not protected by current regulation;
- publish an interagency groundwater monitoring and contamination report;
- file with the governor, lieutenant governor, and speaker of the House of Representatives a report of the TGPC's activities during the biennium proceeding each regular legislative session, including any recommendations for legislation for groundwater protection;
- advise the TCEQ on the development of agricultural chemical plans to prevent groundwater pollution; and
- develop the form and content of notices of groundwater contamination.

The TGPC's membership is composed of the following individuals or their designated representative:

- the executive director of the TCEQ;
- the executive administrator of the TWDB;
- the executive director of the Railroad Commission of Texas;
- the commissioner of Department of State Health Services;
- the deputy commissioner of the Department of Agriculture;
- the executive director of the Texas State Soil and Water Conservation Board;

- a representative selected by the Texas Alliance of Groundwater Districts;
- the director of the Texas A&M AgriLife Research;
- the director of the Bureau of Economic Geology, University of Texas at Austin; and
- a representative of the Water Well Drillers and Water Well Pump Installers Program of the Texas Department of Licensing and Regulation selected by the executive director of the department.

The executive director of the TCEQ serves as the TGPC's chairman. The TCEQ is designated as the lead agency for the TGPC and administers the activities of the TGPC. The executive administrator of the TWDB serves as the TGPC's vice chairman.

The TGPC actively coordinates with federal agencies on groundwater protection issues that affect the state. The TGPC has worked with federal agencies on issues related to a comprehensive state groundwater protection program and the development of pesticide management plans for the prevention of groundwater contamination. In addition, the TGPC has regularly provided national level input to federal agencies on groundwater protection and program issues through the Ground Water Protection Council (an association of state groundwater and underground injection control program directors) and the State Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Issues Research Evaluation Group (a group formed by state agricultural regulatory officials and EPA to discuss and evaluate pesticide matters affecting states), and other state and federal stakeholder and regulatory guidance groups.

The TGPC also works closely with the U.S. Geological Survey (USGS), the federal agency with responsibilities that include national level geologic mapping and hydrologic studies. Staff of the USGS has participated in various TGPC-sponsored projects, providing groundwater expertise and opportunities for state input in federally-sponsored research.

Descriptions of Groundwater Protection Programs

The groundwater protection programs of TGPC member agencies and organizations are described in this section. Detail summary of state groundwater protection programs are also referenced in Table 1.

Texas Commission on Environmental Quality

The TCEQ conducts regulatory groundwater protection programs that focus on both the prevention of contamination and the identification, assessment, and remediation of existing problems. The TCEQ implements these programs through education, voluntary action assistance, permitting, and enforcement. As the state lead agency for water quality protection, the TCEQ administers both state and federally mandated programs. Federal programs administered by the TCEQ include the Resource Conservation and Recovery Act (RCRA); the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); the Clean Water Act (CWA); the Safe Drinking Water Act (SDWA);

and the development of state management plans for prevention of pesticide contamination of groundwater under the FIFRA.

TCEQ is responsible for:

- permitting facilities that store, process, and/or dispose of hazardous and nonhazardous industrial waste, and municipal solid waste and dispose of radioactive materials;
- overseeing the investigation and cleanup of hazardous waste and pollutants released into the environment, including the regulatory programs governing petroleum storage tanks (PSTs), hazardous and nonhazardous industrial waste sites, voluntary cleanups, innocent owner/operator certification, state brownfields initiatives, and Superfund activities;
- collecting and processing waste management data at both the state and national levels;
- the implementation of surface water quality management programs, the development and implementation of water quality standards, and permitting concentrated animal feeding operations, municipal and industrial wastewater treatment facilities, sludge disposal sites, and storm water run-off;
- providing technical support to promote effective and coordinated management of water resources in the state;
- the Edwards Aquifer Protection program, protecting the state's only Sole Source Aquifer;
- professional licensing and the on-site wastewater program; and
- ensuring that groundwater resources are protected during enforcement activities related to municipal solid waste, hazardous, and nonhazardous waste, petroleum storage tanks, agricultural and watershed management, water utilities, and public water supply programs.

Texas Water Development Board

The TWDB conducts an active groundwater resource assessment program. TWDB personnel have identified boundaries and various characteristics for all of the state's major and minor aquifers including water availability, recharge, and other geologic information. In addition, TWDB has identified the major entities using groundwater within each river basin, the aquifer(s) from which they pump, the quality of water being developed, and the quantity of water needed for a 50-year planning period. To accomplish this, TWDB collects data on the occurrence, availability, quality, and quantity of groundwater present and the current and projected demands on groundwater resources. The statewide groundwater level measurement program, groundwater quality sampling program, and groundwater studies are vital to the state's regional water planning efforts.

The purpose of the groundwater quality sampling program is to collect data to: 1) monitor changes, if any, in the quality of groundwater over time and 2) establish,

as accurately as possible, the baseline quality of groundwater occurring naturally in the state's aquifers. TWDB conducts the groundwater quality monitoring program in accordance with procedures established in its Field Manual for Ground Water Sampling and by obtaining data collected by other entities also following these and similar procedures, such as groundwater conservation districts, the U.S. Geological Survey, and other state and federal agencies.

TWDB personnel process and store collected data by state well number in the TWDB groundwater database, including indicators of sample reliability, collecting entity, and analytical laboratory along with sample results. Because personnel identify wells with latitude and longitude, geographical information systems can spatially present water-quality data throughout the state. On occasion, the groundwater resource assessment program allows eligible entities to purchase water-quality lab equipment through agricultural conservation grants funded by the TWDB. Selected constituents reported by grant recipients are also included in the database.

Railroad Commission of Texas

The Railroad Commission of Texas (RRC) regulates the disposal of oil and gas wastes by injection (Statewide Rule 9 (16 Texas Administrative Code (TAC), §3.9), the injection of fluid for enhanced oil recovery (Statewide Rule 46 (16 TAC, §3.46)), and the underground storage of hydrocarbons (Statewide Rules 95, 96, and 97 (16 TAC, §§3.95 through3.97)). The RRC's Underground Injection Control Program for these categories of wells (Class II) is administered under authority issued by EPA under the Safe Drinking Water Act. The focus of the program is the protection of underground sources of drinking water.

Brine mining injection wells (Class III) are typical of solution mining wells. The RRC Class III Brine Mining Injection Well Program was approved on March 29, 2004. Since then, all active brine mining facilities were re-permitted per the provisions of Statewide Rule 81 (16 TAC, §3.81). A majority of brine mining facilities are required to monitor groundwater quality and submit groundwater-monitoring reports. Groundwater monitoring is not conducted at facilities where usable quality groundwater is not present, typically located on salt domes along the Gulf Coast.

Through the Statewide Rule 8 (16 TAC, §3.8) Water Protection Program, the RRC regulates the surface storage and disposal of oil and gas wastes and brine retention facilities associated with brine mining and underground hydrocarbon storage. Rule 8 requires permits for pits and disposal methods that are not specifically authorized by the rule. Many of the pit permits require liners and leak detection systems. Rule 8 permits may also contain groundwater monitoring requirements in certain circumstances.

The RRC also responds to citizen complaints regarding alleged groundwater contamination or alleged unauthorized activities that may endanger groundwater. RRC response may include investigation and sampling by the appropriate district office.

The Surface Mining and Reclamation Division (SMRD) of the RRC is authorized to enforce state laws and regulations consistent with the Texas Surface Coal

Mining and Reclamation Act (Vernon's Texas Codes Annotated, Chapter 134, Texas Natural Resources Code) and Chapter 131 of the Texas Uranium Surface Mining and Reclamation Act.

As part of the groundwater information required in the regulations, determination of the quality of subsurface water includes the analysis of common inorganic groundwater constituents plus certain trace metals. Monitoring plans for pre-mining, mining, and post-mining conditions are required, normally on a three-month basis, in order to track variations in water-quality parameters.

Monitoring by the RRC is generally conducted only during investigations for some specific reason, such as water-quality complaints. The RRC no longer maintains a laboratory, and chemical and physical analysis of samples collected by enforcement personnel are sent to a commercial laboratory under contract with the SMRD. Typically between 5 and 15 water-quality and quantity complaints are investigated annually by RRC field personnel. To date, investigations have not borne out any confirmed contamination cases.

Department of State Health Services

The Department of State Health Services (DSHS) has limited involvement in groundwater protection, although it does provide services that are related to groundwater safety and public health concerns. With regard to groundwater issues, the Community Hygiene Group in the Division of Regulatory Services acts primarily in a non-regulatory manner and serves in an advisory or public service role. If and when public health is impacted by groundwater contamination, the agency's response would focus on providing advice and assistance to the population affected. Since DSHS involvement in groundwater issues is primarily advisory, the agency assists in determining the problem and providing help to the affected public. Regulatory aspects and remediation requirements would, however, be the responsibility of other state and federal agencies, as appropriate.

Although there are no direct programs that relate to groundwater protection, DSHS does have programs that indirectly provide protection to the state's water resources. Under the Regulatory Licensing Unit, the Chemical Reporting Group administers and enforces Tier II reporting of hazardous substances. The Policy Standards and Quality Assurance Unit oversee programs for youth camps, childcare centers and investigate public health nuisance complaints.

The DSHS Laboratory Services Section performs chemical and microbiological analyses for any program at DSHS that needs water quality testing for its samples. For example, the laboratory routinely performs PCB analyses of surface and groundwater samples for the federal PCB program. The Laboratory Services Section also accepts water samples for routine microbiological analysis from the public for a fee.

DSHS offers support on an as-needed basis when issues arise regarding the potential contamination of drinking water, including drinking water that is produced from a groundwater source. In such cases, DSHS may provide analytical, toxicological and epidemiological support for the purpose of protecting the public health.

Texas Department of Agriculture

The Texas Department of Agriculture (TDA) has lead authority for the regulation of pesticides in Texas. The TDA recognizes certain pesticides as having the potential to contaminate groundwater and has primary responsibility in preventing unreasonable risk to human health and the environment from the use of pesticides. The Structural Pest Control Service (SPCS), under the authority of the Texas Department of Agriculture is responsible for the regulation and licensing of persons engaged in the business of structural pest control. SPCS provides customer service to the public and the pest-control industry, while enhancing the educational and professional standards of license holders and ensuring the health, safety and welfare of the public.

The agency conducts a variety of activities designed in part or entirely to reduce the potential of groundwater contamination by pesticides or other agricultural contaminants:

- *Pesticide Applicator Training* - All prospective users of restricted-use or state-limited-use pesticides are required to obtain an applicator's license. This process includes training in the proper and legal use of pesticides, applicator testing, and continuing education

- *Product Registration* - All pesticide products sold and used in Texas must be registered with the TDA. This process ensures these products have met all EPA requirements for use.

- *Pesticide Label Compliance and Enforcement* - The agency has responsibility and authority under the Texas Agricultural Code to enforce pesticide labels, which include use directions and precautions that directly or indirectly reduce the potential of groundwater contamination.

- *Education and Risk Assessment* - The TDA maintains a program to assess the potential impacts of agricultural chemicals on human health and the environment, including groundwater quality. This program directs pesticide-related water quality issues, including those related to the protection of endangered species and wildlife. TDA staff also participates in public education efforts on the safety and use of pesticides. TDA works across agency lines to reduce the input from agriculture into waters of the state from bacterial, nutrient, and sediment runoff from the agricultural sector.

- *Pesticide Management Plan for Prevention of Pesticide Contamination of Groundwater (PMP)* - TDA serves as co-chair of the PMP Task Force, under the authority of the Texas Groundwater Protection Committee (TGPC), which is charged with prioritizing pesticides of interest. These activities are conducted to ensure compliance with federal and state laws and regulations relating to the use of pesticides and the protection of groundwater resources. Additionally, the TDA provides support and assistance in all state environmental projects where agricultural and structural pesticide use and regulation are of concern.

- *Pesticide Laboratory Services* - Although TDA does not normally conduct groundwater monitoring for pesticides, the agency maintains a fully equipped laboratory located on the campus of Texas A&M University in College Station. The lab regularly conducts pesticide residue analysis and pesticide product formulation analysis primarily to monitor product labeling, and to assist the agency's efforts in enforcing state and federal pesticide laws and regulations. TDA participates in the USDA Pesticide Data Program which is a national surveillance program for analysis of produce, and to limited degree water, for the any pesticide residues.

The Texas Legislature also established the Prescribed Burning Board (PBB) and directed its administration through the Texas Department of Agriculture. The PBB sets standards for prescribed burning; coordinates training, certification, and recertification of burn managers; and sets minimum insurance requirements for prescribed burn managers. Prescribed burning is a standardized, accepted rangeland management practice. The controlled application of fire is utilized to meet a variety of objectives. An important use is to conserve water resources by mitigating the undesirable impact of vegetation requiring intensive water consumption. These mandated programs are augmented by TDA's initiatives in riparian invasive species control efforts. Staff addresses regulatory issues; provides technical expertise on human health, environmental, endangered species as well as other non-target effects by pesticides; and facilitate coordination of invasive species control projects.

Texas State Soil and Water Conservation Board

The Texas State Soil and Water Conservation Board (TSSWCB) is the state agency that administers Texas' soil and water conservation law and coordinates conservation and nonpoint source pollution abatement programs throughout the State. Headquartered in Temple, Texas, the TSSWCB offers technical assistance to the state's 216 Soil and Water Conservation Districts (SWCDs).

Nonpoint source pollution originates from different sources that cannot be traced to any single point, such as a pipe. The TSSWCB administers several programs as the lead state agency for the planning, management, and abatement of agricultural and silvicultural (forestry) nonpoint source pollution.

The Water Quality Management Plan (WQMP) Program offers landowners and operators of agricultural and silvicultural lands a voluntary mechanism for being protective of state water quality with respect to nonpoint source pollution. This program offers cost-share funding for the installation of soil and water land improvement measures to serve as an incentive for participating. Additionally, the TSSWCB offers grants for assessment, demonstration, implementation, education, and research related to nonpoint source pollution.

The Water Supply Enhancement Program (formerly the Texas Brush Control Program) protects groundwater resources by controlling invasive brush species which use a lot of water. Controlling the brush and restoring native grasses leaves more water available to recharge the aquifer below. This program has helped restore seeps and springs that had been dormant for decades due to the invasion of non-native brush species.

Texas Alliance of Groundwater Districts

The Texas Alliance of Groundwater Districts (TAGD), formerly the Texas Groundwater Conservation Districts Association, was formed on May 12, 1988. Its core District Membership is restricted to groundwater conservation districts in Texas who have the powers and duties to manage groundwater as defined in Chapter 36 of Texas Water Code; other organizations with an interest in groundwater management may become Associate Members. TAGD is organized exclusively for charitable, educational, or scientific purposes within the meaning of Section 501 (c) (3) of the Internal Revenue Code. As such it can accept tax-deductible donations and use these donations to educate the public to the growing need for water conservation and groundwater protection.

The purpose of TAGD is to educate the public, further groundwater conservation and protection activities, and to provide a communications vehicle for the exchange of information between individual districts and the general public. TAGD maintains contact with members of the private sector and various local, state, and federal officials and their agencies to obtain, and provide, timely information on activities and issues relevant to groundwater conservation districts. To date, there are 77 district members of the Texas Alliance of Groundwater Districts.

The districts are created by the Legislature or by the TCEQ with the purpose and responsibility of preserving and protecting groundwater. Groundwater conservation districts can be created by one of three procedures: (1) special law districts can be established by the legislature; (2) districts can be created through a property-owner petition filed with the TCEQ (Section 36.013 TWC); and (3) districts can be created in priority groundwater management areas through procedures initiated by the TCEQ (Sections 35.012(b) and 36.0151 TWC). Districts are local or regional in their jurisdiction and typically have elected boards of directors. Among other things, groundwater conservation districts have been granted authority to monitor groundwater quality. A number of districts also have the authority to bring civil court proceedings for injunctive relief against an entity causing groundwater contamination.

Texas A&M AgriLife Research

The Texas A&M AgriLife Research has no regulatory authority and does no regulatory monitoring associated with groundwater. Groundwater samples may be collected and analyzed in connection with research investigations. AgriLife Research is the official state-funded agricultural research agency in Texas. Headquartered at Texas A&M University, AgriLife Research promotes food, feed, fiber and bioenergy crop production emphasizing water conservation and protection of natural resources. AgriLife Research operates a system of campus-based research programs and laboratories coupled with 13 regional research centers that are located in all the major land and natural resource regions of Texas. The Texas Water Resources Institute is an administrative unit of AgriLife Research and coordinates much of the internal water-related research.

Broad goals of the AgriLife Research program include those specifically targeted to protect, preserve and efficiently use groundwater resources. Groundwater programs of AgriLife Research stress the development of management strategies,

technologies and educational programs to support sustainable quality water supplies. AgriLife Research scientists are working to address a variety of groundwater planning, supply, quality and use issues.

Recent AgriLife Research groundwater-related research activities include:

- Developing technologies, procedures, and strategies for deficit irrigation applications and effective water management policies to efficiently use and protect the Ogallala Aquifer

- Determining links between pathogens in surface or near-surface sources, runoff, and streams and their impacts on groundwater

- Identifying source of nitrate in groundwater in Texas High Plains and Rolling Plains (Seymour and Ogallala Aquifers). The research is also evaluating and demonstrating measures for reducing nitrate levels in groundwater

- Developing integrated research to enhance water use and drought tolerance of crops, including plant breeding, conservation tillage systems and water management strategies to conserve groundwater

- Evaluation effects of conservation practices on soil and water resources

- Evaluating short- and long-term economic implications of conservation strategies for a groundwater district

- Protecting endangered species while ensuring a stable water supply from the Edwards Aquifer

- Developing a policy assessment tool for the Texas High Plains to enable the impacts of water conservation policies to be soundly evaluated and better strategies developed to manage the groundwater resources

- Training future groundwater professionals through undergraduate and graduate education and research programs at Texas A&M University and other System institutions; Many of AgriLife Research scientists at Texas A&M University in College Station also hold joint teaching appointments, thus providing the latest research results to students.

AgriLife Research efforts are complimented by the outreach educational programs of the Texas A&M AgriLife Extension Service. For example, AgriLife Extension specialists provide educational and training programs and meetings and provide easy-to-read fact sheets and other publications for specific targeted clientele, including agricultural producers and well owners. Other AgriLife Extension activities include field demonstrations and educational programs for youth and adults.

AgriLife Extension specialists provide leadership for educational programs on educating private well owners about potential pollutant sources and what steps can be taken to lessen potential impacts from these sources and plugging

abandoned wells to protect groundwater quality and groundwater conservation districts. Extension specialists also provide technical leadership for development of pesticide-specific management plans adapted to Texas.

Bureau of Economic Geology

The Bureau of Economic Geology (BEG), established in 1909, is a research entity of the University of Texas at Austin and functions as the state Geological Survey. The Bureau conducts basic and applied research projects, including environmental site assessment and investigations of ground-water resources and ground-water quality, in support of other state agency missions.

As part of sponsored-research projects, BEG staff measure ground-water quality and water levels in selected public and private wells. These projects cover many different parts of Texas. Most water-quality data collected in these studies consist of pH, temperature, conductivity, major and minor inorganic ions, total organic carbon, isotopes, and other constituents of interest. Data are used to interpret rates and modes of hydrologic processes and the source and movement of groundwater. Project-specific data are collected in data reports or topical reports. Periodically, the digitized data are compiled for inclusion in the Texas Natural Resources Information System data system.

Texas Department of Licensing and Regulation

The need for identification and protection of the state's groundwater resources was recognized by the Legislature through the creation of the Water Well Drillers Board (Board) in 1965. Acts of the 72nd Legislature, 1991, expanded the Board's functions to include licensing and regulation of water well pump installers.

Acts of the 75th Legislature, 1997 (Senate Bill 1955) transferred the Water Well Driller Advisory Council and the Well Driller/Pump Installer Program from the Texas Natural Resource Conservation Commission to the Texas Department of Licensing and Regulation (TDLR) effective September 1, 1997.

The Well Driller/Pump Installer/Abandoned Well Referral and Notification Program maintains communications with the Council, industry, various state agencies, and groundwater conservation districts and investigates all alleged violations of Texas Occupations Code (TOC), Chapters 1901 and 1902 and 16 TAC, Chapter 76. The Program also investigates consumer complaints filed against well drillers, pump installers, and performs compliance investigations of water, monitor, injection, and dewatering wells to insure compliance with well construction standards.

Investigations include, but are not limited to, surface completions, depth of annular cement, regulated distances from contamination sources and property lines, abandoned and deteriorated water wells, and licensing requirements. In addition, rules requiring isolation of zones containing undesirable or poor quality water are enforced to prevent commingling with and degradation of fresh water zones.

The TDLR's Well Driller/Pump Installer/Abandoned Well Referral and Notification Program staff also administers the Abandoned Well Notification Program. TOC, Chapters 1901 and 1902 authorize this function. Investigations

are conducted and landowners are notified that within one-hundred eighty (180) days of notification, the abandoned and/or deteriorated water well must be plugged, completed, or capped in accordance with 16 Texas Administrative Code Chapter 76 specifications.

Violations of TOC, Chapters 1901 and 1902 and 16 TAC, Chapter 76 are enforced by the TDLR's Enforcement Division through TDLR orders requiring administrative penalties and corrective actions, cease and desist orders or referral to the Office of the Attorney General. Investigations that involve groundwater contamination are referred to the appropriate state agency with jurisdiction for the activity believed to be the cause of the contamination.

Table 1. Summary of State Groundwater Protection Programs

Programs or Activities	Check (X)	Implementation Status	Responsible State Agency
Active SARA Title III Program	X	fully established	TCEQ*
Ambient Groundwater Monitoring System	X	fully established	TWDB
Aquifer Vulnerability Assessment	X	continuing efforts	TCEQ*
Aquifer Mapping	X	fully established	TWDB
Aquifer Characterization	X	fully established	TWDB
Comprehensive Data Management System	X	continuing efforts	TGPC*
State Groundwater Protection Strategy	X	continuing efforts	TGPC*
Dry Cleaner Remediation Program	X	fully established	TCEQ
Groundwater Best Management Practices	X	continuing efforts	TGPC*
Groundwater Legislative Goal	X	fully established	TCEQ*
Groundwater Classification	X	fully established	TGPC*
Groundwater Quality Standards	X	fully established	TCEQ
Interagency Coordination for Groundwater Protection Initiatives	X	fully established	TGPC*
Municipal Setting Designations	X	fully established	TCEQ
Municipal Solid Waste Program (Subtitle D Primacy)	X	fully established	TCEQ
Nonpoint Source Controls/Agricultural & Silvicultural	X	continuing efforts	TSSWCB
Nonpoint Source Controls/All Others	X	continuing efforts	TCEQ
Pesticide State Management Plan (Generic)	X	received EPA concurrence	TGPC*
Pesticide Specific Regulation Programs	X	fully established	TDA
Pollution Prevention Program	X	fully established	All Agencies
Radioactive Waste Disposal Program	X	fully established	TCEQ

Summary of State Groundwater Protection Programs (cont.)

Programs or Activities	Check (X)	Implementation Status	Responsible State Agency
Resource Conservation and Recovery Act (RCRA) Primacy	X	fully established	TCEQ
State Hydrocarbon Exploration/Production Regulations	X	fully established	RRC
State Superfund	X	fully established	TCEQ
State Oilfield Cleanup Fund	X	fully established	RRC
State Petroleum Storage Tank Remediation Fund	X	fully established	TCEQ
State RCRA Program incorporating more stringent requirements than RCRA Primacy		not applicable	
State Septic System Regulations	X	fully established	TCEQ*
Surface Mining and Reclamation Regulations	X	fully established	RRC
Underground Storage Tank Installation Requirements	X	fully established	TCEQ
Underground Storage Tank Registration Program	X	fully established	TCEQ
Underground Injection Control Program/Industrial	X	fully established	TCEQ
Underground Injection Control Program/Oil & Gas	X	fully established	RRC
Vulnerability Assessment for Drinking Water/ Source Water Protection	X	fully established	TCEQ
Wellhead Protection Program (EPA-approved)	X	fully established	TCEQ
Wastewater Permits	X	fully established	TCEQ
Water Well Abandonment Regulations	X	fully established	TDLR
Water Well Installation Regulations	X	fully established	TDLR

Notes:
TCEQ – Texas Commission on Environmental Quality
TGPC – Texas Groundwater Protection Committee
TDA - Texas Department of Agriculture
TDLR- Texas Department of Licensing and Regulation
TWDB - Texas Water Development Board
TSSWCB – Texas State Soil and Water Conservation Board
RRC - Railroad Commission of Texas

* Indicates responsibility for the program falls to more than one state agency.

GROUNDWATER PROTECTION POLICY

TWC, § 26.401 establishes the state's groundwater protection policy. The policy sets out nondegradation of the state's groundwater resources as the goal for all state programs. The policy recognizes the variability of the state's aquifers, the importance of maintaining water quality for existing and potential uses, the protection of the environment and the public health and welfare, and the maintenance and enhancement of the long-term economic health of the state. Further, the policy recognizes that groundwater contamination may result from many sources, including current and past oil and gas production and related practices, agricultural activities, industrial and manufacturing processes, commercial and business endeavors, domestic activities, and natural sources that may be influenced by, or may result from, human activities. The use of the best professional judgment by the responsible state agencies in attaining the goal and policy is also recognized.

The policy states that discharges of pollutants, disposal of wastes, and other regulated activities be conducted in a manner that will maintain present uses and not impair potential uses of groundwater or pose a public health hazard. The programs of the various state agencies are generally coordinated to attain this goal.

The state's policy on groundwater contamination is that the quality should be restored if feasible. Recognizing that in some cases it may not be technically possible or cost-effective to clean groundwater to its original quality, the TGPC recommends an approach that focuses on protection of groundwater for its highest quality use related to human health and the environment, while addressing the costs of available remediation technologies.

Groundwater Classification System

The TGPC and its member agencies recognize that groundwater classification is an important tool to be used in the implementation of the state's groundwater protection policy. Through classification, the groundwater in the state can be categorized and protection or restoration measures can then be specified by member agencies according to the quality and present or potential use of the groundwater.

The TGPC has developed a Groundwater Classification System for use by state agencies. Four groundwater classes are defined based on quality as determined by total dissolved solids (TDS) content. The names and concentration ranges are based on traditional nomenclature associated with each class. Fresh groundwater is classified as having a TDS concentration range from zero to 1,000 milligrams per liter (mg/L); slightly saline groundwater, a TDS concentration range from 1,000 to 3,000 mg/L; moderately saline groundwater, a TDS concentration range from 3,000 to 10,000 mg/L; and very saline groundwater to brine, a TDS concentration greater than 10,000 mg/L. Quality also determines usability; however, it is implicit in the classification that a water-bearing zone must be able to produce sufficient quantities of water to meet its intended use.

The Groundwater Classification System is applicable to all groundwater in the state. In assigning a classification, the member agencies attempt to use the natural quality of the groundwater that is unaffected by discharges of pollutants from human activities. All usable and potentially usable groundwater is subject to the same protection provided by the state's groundwater protection policy. Starting with the nondegradation goal, protection or restoration measures can be varied according to the response level set by the classification so long as the following conditions are met:

- Current groundwater uses are not impaired;
- Potential groundwater uses are not impaired;
- A public health hazard is not created; and
- The quality of groundwater is restored if feasible.

In determining protection or restoration measures, an agency considers all present or potential beneficial uses of groundwater of a given quality. Generally, drinking water for human consumption would require the highest degree of groundwater protection or restoration. Protection for this use will also be protective of all other current or potential uses. These considerations facilitated defining two response levels for purposes of assigning protection or restoration measures that are commensurate with the potential to impact human health and the environment.

- Level I response for the fresh, slightly saline and moderately saline classes should be based on the current or potential use as a human drinking water supply.
- Level II response for the very saline to brine class should be based on indirect exposure (i.e., by means other than drinking) or no human consumption.

In specifying a protection or restoration measure, member agencies should apply best professional judgment on a case-by-case basis. Evaluations to be made include, but are not limited to, such factors as productivity, the availability of alternate sources of water, background concentrations of naturally occurring constituents, the effects of constituents on usability, traditional and potential beneficial uses of the water, economic and technical feasibility of treatment, and projected needs for and types of impacts on these groundwaters.

The classification system is intended to be implemented by member agencies as an integral part of their groundwater protection programs. In addition to its response-setting function, the classification system fosters consistency among the various programs.

State Groundwater Protection Strategy

In evaluating the states' activities under the groundwater protection strategy initiative begun in the early 1980s, the EPA concluded that additional efforts were needed to protect the nation's groundwater, and that groundwater protection programs were a patchwork of federal, state, and local efforts that

focus on individual sources of contamination rather than protection of the resource as a whole. During fiscal years 1992 and 1993, the EPA published guidance for the development of comprehensive state groundwater protection programs (CSGWPP). The CSGWPP guidance encourages the states to further their efforts in developing existing programs into a more comprehensive approach. The final guidance was published early in 1993.

The TGPC is charged with developing a comprehensive strategy that coordinates the activities of all the participating agencies and documents what needs to be done to protect groundwater in the State of Texas. The Committee addressed this duty directly in 1988 through the formal publication of the *Texas Ground Water Protection Strategy*. Since that time, there have been several efforts to describe changes to the groundwater protection programs and authorities of state agencies with respect to groundwater, in the *Texas Ground Water Protection Profiles*, 1991, and later in the various editions of the annual *Joint Groundwater Monitoring and Contamination Report*. There have been many changes in agencies and the programs that they administer since 1988. The more recent publications have focused on the water quality aspects of various programs rather than the state strategy for groundwater protection.

Recognizing the changes that have occurred since the state's first groundwater protection strategy was developed, the TGPC decided in January 2001 to begin the process to update it. That process resulted in the document, *Texas Groundwater Protection Strategy*, TCEQ Publication No. AS-188, February 2003. The *Strategy* provides a road map for the current activities of the TGPC. The *Strategy* is divided into thematic sections designed to highlight the state's current protection efforts, and importantly, identify any gaps that may need to be filled among those programs.

The *Strategy*:

- details the state's groundwater protection goal as established by the Legislature;
- explains the statewide groundwater classification system and how the state identifies contamination and quantity issues;
- describes the roles and responsibilities of the various state agencies involved in groundwater protection and discuss the TGPC as a coordinating mechanism;
- provides examples of how the various state agencies implement groundwater protection programs through regulatory and non-regulatory models;
- explains how the local, state, and federal agencies coordinate management of groundwater data for the enhancement of groundwater protection;
- discusses the role that research plays in understanding groundwater's importance and the importance of coordinating research efforts;
- provides an overview of the groundwater public education efforts in the state;

- discusses public participation in establishing and implementing groundwater policy;

- lays out a planning process for updating the groundwater strategy;

- proposes for inclusion in the next Strategy an identification and raking of significant threats to the state's groundwater resource, consideration of the vulnerability of groundwater resources, and a prioritization of actions to address those threats; and

- provides recommendations and possible actions to protect groundwater.

While the current *Strategy* has served the state well, it is currently being revised to provide an updated road map and address new challenges.

AMBIENT GROUNDWATER MONITORING

The TWDB collects data on the state's aquifers which include the occurrence, availability, quality, and quantity of groundwater present and the current and projected demands on groundwater resources. This is done through the statewide groundwater level measurement program, groundwater quality sampling program, and groundwater studies.

The TWDB sampled approximately 318 sites (wells and springs) in 2012. TWDB's collection of these samples and analysis of additional samples from cooperative entities comprise the ambient groundwater quality sampling program. As cooperators continue to send in data, the actual number of analytical results obtained from sites sampled in 2012 will be greater. TWDB enters water-quality data collected under this program in its groundwater database, scans accompanying images for an image-file database, available on the TWDB's Water, Information, Integration, and Dissemination internet-based mapping application (http://wiid.twdb.state.tx.us/ims/wwm_drl/viewer.htm), and files them in their Located Well Data file room. The sites have accurate latitude and longitude data for use with geographic information systems.

The TGPC relies upon ambient monitoring data available from the TWDB for state groundwater quality information. The TWDB maintains a database of ambient groundwater monitoring data for the state from over 51,000 water wells, and performs ambient groundwater monitoring on water wells in a particular number of Texas aquifers each year, so that all major and minor aquifers of the state are monitored approximately every four years. The TGPC's groundwater quality inventory efforts correspond to the TWDB's monitoring schedule. Ambient monitoring groundwater quality data for all major and minor aquifers used in this report are tabulated in Table 2. The TWDB has published detailed reports of some of its collected groundwater quality data in Hydrologic Atlases of certain individual aquifers. These reports can be found at: http://www.twdb.texas.gov/publications/reports/numbered_reports/index.asp.

Table 2. Ambient Monitoring Groundwater Quality Data
All Major and Minor Aquifers (2003- 2013)

Parameter Groups	Maximum Contamination Limit (MCL[2])	Number of Wells			
		Total Wells sampled	< MDL[1]	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	4,477	2,776	1,298	403
Barium	2 mg/l	4,478	16	4,460	1
Cadmium	5 µg/l	4,449	4,438	27	3
Chromium	100 µg/l	4,476	2,391	2,085	0
Fluoride[3]	4 mg/l	4,646	238	1,050	255
Mercury	2 µg/l	2,490	2,488	2	0
Nitrate (N)	10 mg/l	4,645	1,475	1,751	1,429
Selenium	50 µg/l	4,474	3,006	1,384	84
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	4,645	13	3,980	652
Copper	1 mg/l	4,479	1,984	2,495	0
Fluoride[3]	2 mg/l	4,645	199	3,331	1,115
Iron	0.3 mg/l	4,492	3,255	671	573
Manganese	50 µg/l	4,485	2,028	1,983	474
Sulfate	300 mg/l	4,645	171	3,694	778
Dissolved Solids	1000 mg/l	4,645	0	3,633	1,012
Zinc	5 mg/l	4,479	1,373	3,104	2
Radioactivity					
Gross Alpha	15 pCi/l	724	1	625	98

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.
3. Fluoride has a health based MCL as a primary drinking water standard, and a aesthetic based MCL as a secondary MCL.

REGULATORY MONITORING/GROUNDWATER CONTAMINATION

The groundwater monitoring programs of the participating agencies generally fall within one of three categories:

- regulatory agencies requiring or conducting monitoring to assure compliance with guidelines and regulations for the protection of groundwater from discharges of contaminants;

- agencies or entities conducting monitoring to assess ambient or existing groundwater quality conditions and to track changes in water quality over time; and

- agencies or entities conducting research activities related to groundwater resources and groundwater conservation.

Each regulatory agency which requires or conducts groundwater monitoring to assure compliance with guidelines and regulations to protect groundwater from discharges of contaminants has its own monitoring program requirements and procedures. Criteria used to assess the need for groundwater monitoring vary among the regulatory entities. Major sources of documented or potential groundwater contamination are tabulated in Table 3.

Data indicate that an estimated 31,000 monitor and water wells are being used for groundwater monitoring purposes at regulated facilities statewide in 2012. The majority of the facilities being monitored (approximately 99 percent) are under the jurisdiction of the TCEQ, with the remainder under the jurisdiction of the RRC and TAGD.

The TWDB and the member districts of the TAGD conduct groundwater monitoring to assess ambient groundwater quality conditions through the assessment of particular constituents to track changes in water quality over time. Monitoring program activities reported by the TWDB and participating organizations involved over 318 water wells in 2012.

Additionally, some monitoring programs are developed for water quality assessment studies that target specific geographic areas, specific contaminants or constituents, or specific activities. Contamination cases discovered by these agencies or entities through groundwater studies or groundwater sampling programs are referred to the regulatory agency with appropriate jurisdiction.

The ambient groundwater monitoring network has historic limitations for the parameters that have been analyzed. There are very few historical analyses available for constituents that can generally be attributed to anthropogenic (man-induced) sources.

For example, there are limited analyses available for constituents such as volatile and synthetic organic compounds and certain heavy metals. Ambient monitoring has not traditionally targeted pesticides. Drinking water analyses conducted

under the Safe Drinking Water Act (SDWA) include some pesticides in their suite of chemicals, however, this program targets "finished" water, not groundwater specifically. Analyses conducted under the United States Geological Survey (USGS) National Water Quality Assessment (NWQA) program also include pesticides in a wide range of constituents. TCEQ, TWDB, and members of TAGD have recently begun a cooperative program where ambient groundwater samples collected by TWDB and Groundwater Conservation Districts are analyzed by TCEQ staff.

Table 3. Ten Major Sources of Documented/Potential Groundwater Contamination

Contaminant Source	Factors Considered in Selecting a Contaminant Source [1]	Contaminants [2]
Storage, Treatment, and Disposal Activities		
Storage tanks (underground)	A, B, C, D	D, C
Storage tanks (above ground)	A, B, C, D	D, C
Surface impoundments	A, F, D, C, G	D, G, H, A, B
Landfills	A, F, D, E, G	C, G, A, B, H
Septic systems	F, B, C, D, E, G	E, B, A
Agricultural Activities		
Unknown/not quantified	A, F, C, D, E, G	E, A, B
Other		
Abandoned wells	A, F, C, D, E, G	NA
Oil & Gas activities	F, C, D, E, G	D, G
Grandfathered sites/past practices	A, F, D, E, G	D, E, G, H, A, B
Natural sources	F, E, G, I	G, F, E, H

1. Factors Considered for Selection
   - A. Documented from mandatory reporting
   - B. Size of population at risk
   - C. Location of the sources relative to drinking water sources
   - D. Number and/or size of contaminant sources
   - E. Hydrogeologic sensitivity
   - F. Potential from state and other findings
   - G. Geographic distribution/occurrence
   - H. Human health and/or environmental risk (toxicity)
   - I. Other criteria (described in narrative)

2. Contaminants
   - A. Inorganic compounds
   - B. Organic compounds
   - C. Halogenated solvents
   - D. Petroleum compounds
   - E. Nitrate
   - F. Fluoride
   - G. Salinity/brine
   - H. Metals

In general, the waste disposal programs — primarily the TCEQ's Office of Waste and the RRC — are monitoring existing, permitted facilities. Groundwater monitoring requirements have been established for the petroleum storage tank, industrial and hazardous waste, municipal waste, underground injection control, and enforcement programs. Initiatives in the municipal and industrial wastewater permitting program have required groundwater monitoring at facilities where activities pose a higher risk to groundwater quality. Additionally, permits required for surface storage and disposal of oil and gas waste and brine

retention ensure the protection of groundwater by requiring pond liners, leak detection systems, groundwater monitoring, or a combination of these methods.

In the drinking water program, public water supply wells are also regulated by the TCEQ's Office of Water. Public water systems receive sufficient monitoring to ensure that violations of drinking water standards are detected and addressed before water is distributed to consumers.

Currently, there is no state program for monitoring domestic wells, though some groundwater conservation districts do have programs that routinely monitor private water wells for ambient conditions or suspected contamination. The TDLR is responsible for oversight of licensed water well drillers, responding to complaints, and routinely checking compliance with TDLR rules.

Table 4. Statewide Documented Groundwater Contamination Cases by Agency/Activity Status, 2012

Agency/Division	Total Cases (2012)[1]	New Cases (2012)[2]	Activity Status Code[3]							
			0	1	2	3	4	5	6	None
Texas Commission on Environmental Quality										
/Remediation Division - Corrective Action Program	565	13	4	30	167	161	247	293	23	0
/Remediation Division - Dry Cleaners Remediation	175	4	108	4	213	4	36	6	12	0
/Remediation Division - Petroleum Storage Tanks	1,386	193	0	152	763	0	171	0	300	0
/Remediation Division - Superfund Cleanup Program	87	0	0	0	23	11	2	49	2	0
/Remediation Division - Superfund Site Discovery & Assessment	10	4	0	16	8	0	0	0	0	0
/Remediation Division - Voluntary Cleanup (VC)	628	119	0	24	219	15	134	121	123	0
/Remediation Division – VC- Innocent Landowner	196	43	68	42	58	0	0	0	28	0
/Remediation Division - Brownfields Site Assessment	2	2	0	0	1	0	0	0	1	0
/Enforcement Division	4	0	1	0	3	0	0	0	0	0
/Regional Offices	1	0	0	0	0	0	0	0	0	1
/Water Availability Division /GW Planning & Assessment	5	0	3	2	0	0	0	0	0	0
/Water Supply Division/Public Drinking Water Section	6	6	0	0	0	0	0	0	6	0
/Waste Permits Division - Industrial & Hazardous Waste	1	0	0	1	0	0	0	0	0	0
/Waste Permits Division - Municipal Solid Waste	64	5	2	0	39	3	17	15	4	0
/Water Quality Division	16	0	0	0	7	2	6	1	0	0
/Radioactive Materials Division	4	0	0	0	1	0	0	0	0	3
Subtotal	3,150	389	183	272	1,504	196	613	485	499	4
Railroad Commission of Texas/Oil and Gas Division	476	42	0	19	60	91	158	132	16	0
Texas Alliance of Groundwater Districts	1	0	0	0	0	0	1	0	0	0
Total	3,627	431	183	291	1,564	287	772	617	515	8

Notes: 1. Total number of groundwater contamination cases documented or under enforcement during calendar year 2012.
2. Number of new cases documented or under enforcement during calendar year 2012.
3. Activity Status Codes: 0—No Activity; 1—Contamination Confirmed; 2—Ongoing Investigation; 3—Corrective Action Planning; 4—Corrective Action Implementation; 5—Monitoring Action; 6—Action Completed. Facilities may have more than one Activity Status Code.

Table 5. Groundwater Contamination Summary / Selected Major and Minor Aquifers Outcrops (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	Yes	74	4	14	10	2	42	2	VOCs, chromium benzene, TCE, high explosives,
CERCLIS (non-NPL)	Yes	623	46	243	10	104	75	77	VOC's, Metla, TPH, Chlorinated Solvents
DOD/DOE	No								
LUST*	Yes	844	19	479	0	136	2	151	gasoline, diesel, waste oil, jet fuel, BTEX, TPH
RCRA Corrective Action	Yes	390	23	54	58	110	67	17	VOCs, BTEX, TPH, chromium, lead
Underground Injection	No								
State Sites*	Yes	36		19	3	10	1	1	VOC's, Creosote, pH, Epichlorohydrin, DCE
Nonpoint Sources	No								
Oil/Gas Activities	Yes	390	13	47	80	120	121	3	VOCs, NaCl, crude oil, natural gas, HCL, sulfates, chromium
Totals		2,357	105	856	161	482	308	251	

NPL - National Priority List

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System

DOE - Department of Energy

DOD - Department of Defense

LUST - Leaking Underground Storage Tanks

RCRA - Resource Conservation and Recovery Act

*These sites may be combined with NPL and RCRA sites

GROUNDWATER ASSESSMENT

The methodology and limitations of this groundwater assessment are provided in this section.

Methodology Used in the Preparation of this Report

The TGPC member agencies provide data for the TGPC's groundwater quality inventorying efforts. In 1996, the TGPC, through the partnership of two of its member agencies, the TCEQ and the TWDB, began this process by performing an inventory of the groundwater quality of one major, one minor, and two of Texas' local aquifer systems. This information was published in the TCEQ's State of Texas Water Quality Inventory 1996, addressing both surface water and groundwater quality (TCEQ, 1996).

EPA representatives requested that the 1998 report update emphasize the spatial and graphical representation of the most recent available groundwater quality data, with maps showing examples of groundwater quality in wells located in the selected aquifers. Subsequent reports continued this spatial and graphical representation through all 21 minor and 9 major aquifers.

Ambient groundwater data from 2003 through 2013 was selected for use in the preparation of this report. Standard anion and cation analysis was sorted by aquifer identification number from the "aquifer id" field in the database, and the data was then transferred into smaller aquifer-specific .dbf files for use in Geographic Information System (GIS) projects. The constituents available for each of the aquifers included calcium, magnesium, silica, sodium, potassium, sulfate, chloride, nitrate and total dissolved solids (TDS).

Infrequent analysis was sorted by constituent on a statewide basis, and again saved as .dbf files for use in GIS applications. The constituents available from the infrequent analysis data included arsenic, barium, boron, cadmium, chromium, copper, iron, manganese, selenium, and zinc. Radionuclides were sorted on a statewide basis from the ambient groundwater data as Gross Alpha.

It is important to note here that for all of the constituents of interest, the data was sorted and culled to eliminate duplicate values for any given well, giving a "snapshot" of the most current concentration values available. Concentrations illustrated in previous reports may have changed at specific sampling sites.

With each of the constituents, the GIS files were used to illustrate concentrations above an accepted regulatory value, usually a Maximum Contaminant Level as established by the U. S. Environmental Protection Agency, and a discussion of the findings follows in the Groundwater Concerns/Issues section of this report.

What percentage of wells with concentrations above the MCL constitute a "concern" for TCEQ? In this report, no specific percentage was used, rather, staff examined the data and weighed the numbers of samples, the extent of the aquifer, the demand in or use of the aquifer, and the distribution of the concentrations to give a "ranking" to the relative importance of the concentration

data. GIS generated maps are included for select aquifers in the Groundwater Concerns/Issues section of this report to illustrate the spatial distribution of concentrations that have "ranked" as a higher concern.

As an example of this process in 1998, the Marathon aquifer had nitrate values exceeding the MCL in 75% of the water wells sampled. The Ogallala, on the other hand, had nitrate values that exceed the MCL in only 43% of the wells sampled. Staff determined that the situation in the Ogallala aquifer is of greater concern than the situation in the Marathon aquifer, because only four wells were sampled in the Marathon aquifer, as opposed to 1,012 in the Ogallala. Three of the wells sampled in the Marathon showed nitrate values in excess of the MCL, while 439 wells in the Ogallala showed similar results. This, coupled with the high demand for water in the Ogallala, and the spatial distribution of the high nitrate values (being more concentrated in a specific region of the aquifer) generates greater concern for the Ogallala than for the Marathon.

Limitations

Data from the TWDB's ambient groundwater quality database contains a large amount of data collected over a span of several decades. Quantitative laboratory methods used to analyze water samples have changed over time, and even in recent years, analysis may be done by a lab, or by Hach "kits". Consequently, the data is not directly comparable without qualification.

Additionally, wells are sampled on a cycle, and there may be several intervening years between sample events. Aquifer conditions due to drought, seasonal variation or local flow directions are not considered in the sampling program. Analytical results, even if comparable by consistent lab methods, may still not be comparable over time due to cyclical variation in aquifer conditions.

This analysis is intended as a "reconnaissance" of potential problem areas for the purpose of this inventory, so variability of results from different methods of analysis is not considered, nor is cyclical variation due to aquifer conditions. Again, this report is intended to present a "snapshot" of Texas' groundwater quality conditions for each of the major and minor aquifers.

While Maximum Contaminant Levels for drinking water are based on "total" values for a constituent, the greatest amount of data available is for "dissolved" concentrations. In this report, "dissolved" concentrations were used, except for mercury, and as a general rule, "dissolved" concentrations are slightly lower than the "total" values in most instances. The tables and maps may portray a slightly better situation in terms of groundwater quality than actually exists in the field, however, they nonetheless serve to illustrate the need for concern for certain areas and constituents.

Gross Alpha values are used as an indicator for naturally occurring radioactive elements. If the value for Gross Alpha exceeds 15 pCi/l at a public drinking water system, then additional analysis is required to determine the source, generally radium or uranium. Gross Beta was shown on quality tables in the past, but this has been discontinued with this report, as Gross Beta is more of an indicator of man-made radioactive constituents, and there are only two or three sites in the state where this analysis would be considered applicable.

The lack of sophistication in the assessment methodology for this report is also a limitation. Basically, analysis of the data is an "eyeball" approach to character water quality; however, as an indicator of potential problems, and a "reconnaissance" of areas of concern, this approach is adequate, given the size of the state and the volume of data available.

Readers should bear in mind that this report is a quality inventory, and that the various limitations should restrict the conclusions that can be drawn from this data. This report may be used, however, to give guidance to researchers for future investigations to better characterize aquifer quality. Similarly, water resource planners, water suppliers and regulators could use this report to add a water quality component to their future planning efforts. Research on the occurrence and distribution of nitrate, for example are done by the Bureau of Economic Geology of the University of Texas to obtain more precise data on the aquifers where this constituent occur in high concentrations.

Ambient Groundwater Monitoring Tabulated Aquifer Data

Table 6. Ambient Monitoring Groundwater Quality Data
Blaine Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	51	29	21	1
Barium	2 mg/l	51	0	51	0
Cadmium	5 µg/l	51	50	1	0
Chromium	100 µg/l	51	19	32	0
Fluoride	4 mg/l	51	1	50	0
Mercury	2 µg/l	27	27	0	0
Nitrate (N)	10 mg/l	51	2	11	38
Selenium	50 µg/l	51	6	32	13
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	51	1	32	18
Copper	1 mg/l	51	3	48	0
Fluoride	2 mg/l	51	1	49	1
Iron	0.3 mg/l	51	35	13	3
Manganese	50 µg/l	51	21	28	2
Sulfate	300 mg/l	51	0	1	50
Dissolved Solids	1000 mg/l	51	0	1	50
Zinc	5 mg/l	51	0	51	0
Radioactivity					
Gross Alpha	15 pCi/l	8	0	8	0

Notes:
1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 7. Ambient Monitoring Groundwater Quality Data Blossom Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	17	15	2	0
Barium	2 mg/l	17	0	17	0
Cadmium	5 µg/l	17	17	0	0
Chromium	100 µg/l	17	8	9	0
Fluoride	4 mg/l	17	1	16	0
Mercury	2 µg/l	0	0	0	0
Nitrate (N)	10 mg/l	17	11	4	2
Selenium	50 µg/l	17	7	10	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	17	0	16	1
Copper	1 mg/l	17	9	8	0
Fluoride	2 mg/l	17	1	16	0
Iron	0.3 mg/l	17	14	2	1
Manganese	50 µg/l	17	1	14	2
Sulfate	300 mg/l	17	0	15	2
Dissolved Solids	1000 mg/l	17	0	12	5
Zinc	5 mg/l	17	4	13	0
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 8. Ambient Monitoring Groundwater Quality Data
Bone Springs-Victoria Peak Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	2	1	1	0
Barium	2 mg/l	2	0	2	0
Cadmium	5 µg/l	2	2	0	0
Chromium	100 µg/l	2	2	0	0
Fluoride	4 mg/l	2	2	0	0
Mercury	2 µg/l	2	2	0	0
Nitrate (N)	10 mg/l	2	0	0	2
Selenium	50 µg/l	2	0	2	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	2	0	0	2
Copper	1 mg/l	2	1	1	0
Fluoride	2 mg/l	2	2	0	0
Iron	0.3 mg/l	2	0	2	0
Manganese	50 µg/l	2	1	1	0
Sulfate	300 mg/l	2	0	0	2
Dissolved Solids	1000 mg/l	2	0	0	2
Zinc	5 mg/l	2	0	2	0
Radioactivity					
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 9. Ambient Monitoring Groundwater Quality Data Brazos River Alluvium Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	11	4	7	0
Barium	2 mg/l	11	0	10	0
Cadmium	5 µg/l	11	11	0	0
Chromium	100 µg/l	11	0	11	0
Fluoride	4 mg/l	11	0	11	0
Mercury	2 µg/l	5	5	0	0
Nitrate (N)	10 mg/l	11	2	6	3
Selenium	50 µg/l	11	7	4	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	11	0	10	1
Copper	1 mg/l	11	7	4	0
Fluoride	2 mg/l	11	0	11	0
Iron	0.3 mg/l	11	6	0	5
Manganese	50 µg/l	11	3	2	6
Sulfate	300 mg/l	11	0	9	2
Dissolved Solids	1000 mg/l	11	0	7	4
Zinc	5 mg/l	11	3	8	0
Radioactivity					
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 10. Ambient Monitoring Groundwater Quality Data Capitan Reef Complex Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	24	19	3	2
Barium	2 mg/l	25	0	25	0
Cadmium	5 µg/l	24	24	0	0
Chromium	100 µg/l	24	17	7	0
Fluoride	4 mg/l	25	3	22	0
Mercury	2 µg/l	7	7	0	0
Nitrate (N)	10 mg/l	25	9	13	3
Selenium	50 µg/l	24	9	12	3
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	25	1	17	7
Copper	1 mg/l	24	10	14	0
Fluoride	2 mg/l	25	3	14	8
Iron	0.3 mg/l	25	12	10	3
Manganese	50 µg/l	24	8	12	4
Sulfate	300 mg/l	25	0	12	13
Dissolved Solids	1000 mg/l	25	0	13	13
Zinc	5 mg/l	24	3	21	0
Radioactivity					
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 11. Ambient Monitoring Groundwater Quality Data Carrizo - Wilcox Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	485	466	19	0
Barium	2 mg/l	485	0	485	0
Cadmium	5 µg/l	484	481	3	0
Chromium	100 µg/l	485	330	155	0
Fluoride	4 mg/l	503	23	475	5
Mercury	2 µg/l	343	342	1	0
Nitrate (N)	10 mg/l	503	420	67	16
Selenium	50 µg/l	485	436	48	1
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	503	2	479	22
Copper	1 mg/l	485	391	94	0
Fluoride	2 mg/l	503	23	468	12
Iron	0.3 mg/l	485	276	71	138
Manganese	50 µg/l	481	40	297	144
Sulfate	300 mg/l	503	53	433	17
Dissolved Solids	1000 mg/l	503	0	466	37
Zinc	5 mg/l	485	242	243	0
Radioactivity					
Gross Alpha	15 pCi/l	29	0	28	1

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 12. Ambient Monitoring Groundwater Quality Data Dockum Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	104	57	43	4
Barium	2 mg/l	107	0	107	0
Cadmium	5 µg/l	107	107	0	0
Chromium	100 µg/l	107	70	37	0
Fluoride	4 mg/l	107	6	95	6
Mercury	2 µg/l	53	53	0	0
Nitrate (N)	10 mg/l	107	29	31	47
Selenium	50 µg/l	107	59	46	2
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	107	0	82	25
Copper	1 mg/l	107	38	69	0
Fluoride	2 mg/l	107	6	61	40
Iron	0.3 mg/l	107	58	28	21
Manganese	50 µg/l	107	39	50	18
Sulfate	300 mg/l	107	0	71	36
Dissolved Solids	1000 mg/l	107	0	65	42
Zinc	5 mg/l	107	27	80	0
Radioactivity					
Gross Alpha	15 pCi/l	86	0	51	35

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 13. Ambient Monitoring Groundwater Quality Data Edwards (Balcones Fault Zone) Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	279	262	12	5
Barium	2 mg/l	280	1	279	0
Cadmium	5 µg/l	278	278	0	0
Chromium	100 µg/l	280	181	99	0
Fluoride	4 mg/l	292	31	151	10
Mercury	2 µg/l	136	136	0	0
Nitrate (N)	10 mg/l	292	41	200	51
Selenium	50 µg/l	279	254	18	7
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	292	1	282	9
Copper	1 mg/l	279	135	144	0
Fluoride	2 mg/l	292	31	217	44
Iron	0.3 mg/l	279	233	21	25
Manganese	50 µg/l	279	219	54	6
Sulfate	300 mg/l	292	1	273	18
Dissolved Solids	1000 mg/l	292	0	274	18
Zinc	5 mg/l	280	144	136	0
Radioactivity					
Gross Alpha	15 pCi/l	29	0	28	1

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 14. Ambient Monitoring Groundwater Quality Data Edwards – Trinity (Plateau) Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	607	510	87	10
Barium	2 mg/l	607	1	606	0
Cadmium	5 µg/l	607	602	4	1
Chromium	100 µg/l	607	344	263	0
Fluoride	4 mg/l	607	9	590	8
Mercury	2 µg/l	213	212	1	0
Nitrate (N)	10 mg/l	607	36	290	281
Selenium	50 µg/l	607	410	195	2
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	607	1	500	106
Copper	1 mg/l	607	173	434	0
Fluoride	2 mg/l	607	9	460	138
Iron	0.3 mg/l	607	522	43	42
Manganese	50 µg/l	607	388	195	24
Sulfate	300 mg/l	607	1	428	178
Dissolved Solids	1000 mg/l	607	0	438	169
Zinc	5 mg/l	607	62	545	0
Radioactivity					
Gross Alpha	15 pCi/l	3	0	2	1

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 15. Ambient Monitoring Groundwater Quality Data Edwards – Trinity (High Plains) Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	14	1	7	6
Barium	2 mg/l	14	0	14	0
Cadmium	5 µg/l	14	14	0	0
Chromium	100 µg/l	14	7	7	0
Fluoride	4 mg/l	14	0	8	6
Mercury	2 µg/l	10	10	0	0
Nitrate (N)	10 mg/l	14	3	2	9
Selenium	50 µg/l	14	3	9	2
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	14	0	10	4
Copper	1 mg/l	14	2	12	0
Fluoride	2 mg/l	14	0	1	13
Iron	0.3 mg/l	14	8	5	1
Manganese	50 µg/l	14	7	7	0
Sulfate	300 mg/l	14	0	11	3
Dissolved Solids	1000 mg/l	14	0	8	6
Zinc	5 mg/l	14	2	12	0
Radioactivity					
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 16. Ambient Monitoring Groundwater Quality Data Ellenburger – San Saba Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	60	58	2	0
Barium	2 mg/l	60	0	60	0
Cadmium	5 µg/l	60	60	0	0
Chromium	100 µg/l	60	19	41	0
Fluoride	4 mg/l	65	12	52	1
Mercury	2 µg/l	51	51	0	0
Nitrate (N)	10 mg/l	65	7	46	12
Selenium	50 µg/l	60	56	4	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	65	0	63	2
Copper	1 mg/l	60	16	44	0
Fluoride	2 mg/l	65	12	49	4
Iron	0.3 mg/l	61	45	6	10
Manganese	50 µg/l	61	40	21	0
Sulfate	300 mg/l	65	0	61	4
Dissolved Solids	1000 mg/l	65	0	60	5
Zinc	5 mg/l	60	16	44	0
Radioactivity					
Gross Alpha	15 pCi/l	17	0	16	1

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 17. Ambient Monitoring Groundwater Quality Data Gulf Coast Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	707	350	250	107
Barium	2 mg/l	707	0	706	1
Cadmium	5 µg/l	707	703	4	0
Chromium	100 µg/l	707	297	410	0
Fluoride	4 mg/l	733	9	720	4
Mercury	2 µg/l	483	483	0	0
Nitrate (N)	10 mg/l	733	398	224	111
Selenium	50 µg/l	707	557	147	3
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	733	0	568	165
Copper	1 mg/l	707	369	338	0
Fluoride	2 mg/l	733	9	681	43
Iron	0.3 mg/l	707	422	173	112
Manganese	50 µg/l	707	201	353	153
Sulfate	300 mg/l	733	105	583	45
Dissolved Solids	1000 mg/l	733	0	580	153
Zinc	5 mg/l	707	258	449	0
Radioactivity					
Gross Alpha	15 pCi/l	351	1	313	37

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 18. Ambient Monitoring Groundwater Quality Data Hickory Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	76	58	17	1
Barium	2 mg/l	76	0	76	0
Cadmium	5 µg/l	76	76	0	0
Chromium	100 µg/l	76	55	21	0
Fluoride	4 mg/l	79	19	59	1
Mercury	2 µg/l	46	46	0	0
Nitrate (N)	10 mg/l	79	30	42	17
Selenium	50 µg/l	76	63	13	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	79	0	75	4
Copper	1 mg/l	76	27	49	0
Fluoride	2 mg/l	79	19	57	3
Iron	0.3 mg/l	76	36	24	16
Manganese	50 µg/l	76	26	43	7
Sulfate	300 mg/l	79	1	77	1
Dissolved Solids	1000 mg/l	79	0	75	4
Zinc	5 mg/l	76	20	56	0
Radioactivity					
Gross Alpha	15 pCi/l	30	0	18	12

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 19. Ambient Monitoring Groundwater Quality Data Hueco – Mesilla Bolson Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	18	0	8	10
Barium	2 mg/l	18	0	18	0
Cadmium	5 µg/l	18	18	0	0
Chromium	100 µg/l	18	10	8	0
Fluoride	4 mg/l	18	8	9	1
Mercury	2 µg/l	11	11	0	0
Nitrate (N)	10 mg/l	18	7	10	1
Selenium	50 µg/l	18	9	9	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	18	0	7	11
Copper	1 mg/l	18	11	7	0
Fluoride	2 mg/l	18	8	9	1
Iron	0.3 mg/l	18	7	11	0
Manganese	50 µg/l	18	1	13	4
Sulfate	300 mg/l	18	0	11	7
Dissolved Solids	1000 mg/l	18	0	8	10
Zinc	5 mg/l	18	1	17	0
Radioactivity					
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 20. Ambient Monitoring Groundwater Quality Data Igneous Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	16	7	7	2
Barium	2 mg/l	16	0	16	0
Cadmium	5 µg/l	16	16	0	0
Chromium	100 µg/l	16	8	8	0
Fluoride	4 mg/l	34	0	32	2
Mercury	2 µg/l	1	1	0	0
Nitrate (N)	10 mg/l	34	2	29	3
Selenium	50 µg/l	16	11	5	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	34	0	33	1
Copper	1 mg/l	16	7	9	0
Fluoride	2 mg/l	34	0	19	15
Iron	0.3 mg/l	16	16	0	0
Manganese	50 µg/l	16	10	5	1
Sulfate	300 mg/l	34	1	31	2
Dissolved Solids	1000 mg/l	34	0	33	1
Zinc	5 mg/l	16	4	12	0
Radioactivity					
Gross Alpha	15 pCi/l	1	0	1	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 21. Ambient Monitoring Groundwater Quality Data Lipan Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	26	3	23	0
Barium	2 mg/l	26	0	26	0
Cadmium	5 µg/l	26	26	0	0
Chromium	100 µg/l	26	14	12	0
Fluoride	4 mg/l	26	0	26	0
Mercury	2 µg/l	25	25	0	0
Nitrate (N)	10 mg/l	26	1	0	25
Selenium	50 µg/l	26	10	16	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	26	0	16	10
Copper	1 mg/l	26	0	26	0
Fluoride	2 mg/l	26	0	26	0
Iron	0.3 mg/l	26	24	2	0
Manganese	50 µg/l	26	22	4	0
Sulfate	300 mg/l	26	0	16	8
Dissolved Solids	1000 mg/l	26	0	13	13
Zinc	5 mg/l	26	5	21	0
Radioactivity					
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 22. Ambient Monitoring Groundwater Quality Data Marathon Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	21	21	0	0
Barium	2 mg/l	21	0	21	0
Cadmium	5 µg/l	21	21	0	0
Chromium	100 µg/l	21	1	20	0
Fluoride	4 mg/l	21	0	21	0
Mercury	2 µg/l	20	20	0	0
Nitrate (N)	10 mg/l	21	3	14	4
Selenium	50 µg/l	21	13	7	1
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	21	0	21	0
Copper	1 mg/l	21	6	15	0
Fluoride	2 mg/l	21	0	21	0
Iron	0.3 mg/l	21	18	2	1
Manganese	50 µg/l	21	9	10	2
Sulfate	300 mg/l	21	0	15	6
Dissolved Solids	1000 mg/l	21	0	17	4
Zinc	5 mg/l	21	2	19	0
Radioactivity					
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 23. Ambient Monitoring Groundwater Quality Data Marble Falls Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	5	5	0	0
Barium	2 mg/l	5	0	5	0
Cadmium	5 µg/l	5	5	0	0
Chromium	100 µg/l	5	1	4	0
Fluoride	4 mg/l	5	0	5	0
Mercury	2 µg/l	2	2	0	0
Nitrate (N)	10 mg/l	5	0	4	1
Selenium	50 µg/l	5	5	0	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	5	0	5	0
Copper	1 mg/l	5	1	4	0
Fluoride	2 mg/l	5	0	4	1
Iron	0.3 mg/l	5	5	0	0
Manganese	50 µg/l	5	2	3	0
Sulfate	300 mg/l	5	0	5	0
Dissolved Solids	1000 mg/l	5	0	5	0
Zinc	5 mg/l	5	1	4	0
Radioactivity					
Gross Alpha	15 pCi/l	3	0	3	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 24. Ambient Monitoring Groundwater Quality Data Nacatoch Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	8	5	3	0
Barium	2 mg/l	8	8	0	0
Cadmium	5 µg/l	8	8	0	0
Chromium	100 µg/l	8	2	6	0
Fluoride	4 mg/l	8	0	8	0
Mercury	2 µg/l	4	4	0	0
Nitrate (N)	10 mg/l	8	8	0	0
Selenium	50 µg/l	8	6	2	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	8	0	6	2
Copper	1 mg/l	8	6	2	0
Fluoride	2 mg/l	8	0	6	2
Iron	0.3 mg/l	8	6	2	0
Manganese	50 µg/l	8	3	5	0
Sulfate	300 mg/l	8	1	6	1
Dissolved Solids	1000 mg/l	8	0	6	2
Zinc	5 mg/l	8	0	8	0
Radioactivity					
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 25. Ambient Monitoring Groundwater Quality Data Ogallala Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	1,034	171	635	228
Barium	2 mg/l	1,034	0	1,034	0
Cadmium	5 µg/l	1,034	1,025	9	0
Chromium	100 µg/l	1,034	454	580	0
Fluoride	4 mg/l	1,034	45	815	174
Mercury	2 µg/l	612	612	0	0
Nitrate (N)	10 mg/l	1,034	6	428	600
Selenium	50 µg/l	1,034	632	630	42
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	1,034	0	885	149
Copper	1 mg/l	1,034	352	682	0
Fluoride	2 mg/l	1,034	45	414	575
Iron	0.3 mg/l	1,034	864	84	86
Manganese	50 µg/l	1,034	678	316	40
Sulfate	300 mg/l	1,034	2	860	172
Dissolved Solids	1000 mg/l	1,034	0	813	221
Zinc	5 mg/l	1,034	298	736	0
Radioactivity					
Gross Alpha	15 pCi/l	132	0	127	5

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 26. Ambient Monitoring Groundwater Quality Data Pecos Valley Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	89	52	30	7
Barium	2 mg/l	89	0	89	0
Cadmium	5 µg/l	89	88	1	0
Chromium	100 µg/l	89	57	32	0
Fluoride	4 mg/l	99	1	96	2
Mercury	2 µg/l	34	34	0	0
Nitrate (N)	10 mg/l	99	17	41	41
Selenium	50 µg/l	89	37	49	3
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	99	0	57	42
Copper	1 mg/l	89	26	63	0
Fluoride	2 mg/l	99	1	56	42
Iron	0.3 mg/l	89	57	17	15
Manganese	50 µg/l	89	35	40	14
Sulfate	300 mg/l	99	0	37	62
Dissolved Solids	1000 mg/l	99	0	37	62
Zinc	5 mg/l	89	13	76	0
Radioactivity					
Gross Alpha	15 pCi/l	1	0	0	1

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 27. Ambient Monitoring Groundwater Quality Data Queen City Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	49	48	1	0
Barium	2 mg/l	49	1	48	0
Cadmium	5 µg/l	49	48	1	0
Chromium	100 µg/l	49	36	13	0
Fluoride	4 mg/l	55	15	40	0
Mercury	2 µg/l	32	32	0	0
Nitrate (N)	10 mg/l	55	37	7	11
Selenium	50 µg/l	49	41	8	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	55	2	49	4
Copper	1 mg/l	49	25	24	0
Fluoride	2 mg/l	55	15	39	1
Iron	0.3 mg/l	49	24	12	13
Manganese	50 µg/l	49	4	34	11
Sulfate	300 mg/l	55	2	46	7
Dissolved Solids	1000 mg/l	55	0	46	9
Zinc	5 mg/l	49	9	39	1
Radioactivity					
Gross Alpha	15 pCi/l	1	0	1	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 28. Ambient Monitoring Groundwater Quality Data Rita Blanca Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	9	2	5	2
Barium	2 mg/l	9	0	9	0
Cadmium	5 µg/l	9	9	0	0
Chromium	100 µg/l	9	7	2	0
Fluoride	4 mg/l	9	1	5	3
Mercury	2 µg/l	8	8	0	0
Nitrate (N)	10 mg/l	9	0	8	1
Selenium	50 µg/l	9	6	3	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	9	0	9	0
Copper	1 mg/l	9	5	4	0
Fluoride	2 mg/l	9	1	5	3
Iron	0.3 mg/l	9	6	2	1
Manganese	50 µg/l	9	3	5	1
Sulfate	300 mg/l	9	0	8	1
Dissolved Solids	1000 mg/l	9	0	7	2
Zinc	5 mg/l	9	2	7	0
Radioactivity					
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 29. Ambient Monitoring Groundwater Quality Data Rustler Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	9	9	0	0
Barium	2 mg/l	9	0	9	0
Cadmium	5 µg/l	9	9	0	0
Chromium	100 µg/l	9	8	1	0
Fluoride	4 mg/l	9	0	9	0
Mercury	2 µg/l	7	7	0	0
Nitrate (N)	10 mg/l	9	5	0	4
Selenium	50 µg/l	9	8	1	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	9	0	5	4
Copper	1 mg/l	9	9	0	0
Fluoride	2 mg/l	9	0	4	5
Iron	0.3 mg/l	9	7	2	0
Manganese	50 µg/l	9	2	7	0
Sulfate	300 mg/l	9	0	0	9
Dissolved Solids	1000 mg/l	9	0	2	7
Zinc	5 mg/l	9	5	4	0
Radioactivity					
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 30. Ambient Monitoring Groundwater Quality Data Seymour Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	62	21	40	1
Barium	2 mg/l	62	0	62	0
Cadmium	5 µg/l	62	62	0	0
Chromium	100 µg/l	62	25	37	0
Fluoride	4 mg/l	62	1	60	1
Mercury	2 µg/l	39	39	0	0
Nitrate (N)	10 mg/l	62	0	4	58
Selenium	50 µg/l	62	27	32	3
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	62	0	49	13
Copper	1 mg/l	62	1	61	0
Fluoride	2 mg/l	62	1	57	4
Iron	0.3 mg/l	62	58	3	1
Manganese	50 µg/l	62	25	37	0
Sulfate	300 mg/l	62	1	48	13
Dissolved Solids	1000 mg/l	62	0	41	21
Zinc	5 mg/l	62	5	57	0
Radioactivity					
Gross Alpha	15 pCi/l	4	0	4	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 31. Ambient Monitoring Groundwater Quality Data Sparta Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	20	20	0	0
Barium	2 mg/l	20	0	20	0
Cadmium	5 µg/l	20	20	0	0
Chromium	100 µg/l	20	17	3	0
Fluoride	4 mg/l	24	2	22	0
Mercury	2 µg/l	14	14	0	0
Nitrate (N)	10 mg/l	24	2	22	0
Selenium	50 µg/l	20	15	4	1
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	24	0	19	5
Copper	1 mg/l	20	14	6	0
Fluoride	2 mg/l	24	2	21	1
Iron	0.3 mg/l	20	11	3	6
Manganese	50 µg/l	20	1	16	3
Sulfate	300 mg/l	24	2	18	4
Dissolved Solids	1000 mg/l	24	0	17	7
Zinc	5 mg/l	20	8	12	0
Radioactivity					
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 32. Ambient Monitoring Groundwater Quality Data Trinity Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	568	516	45	7
Barium	2 mg/l	564	4	560	0
Cadmium	5 µg/l	558	555	1	2
Chromium	100 µg/l	563	360	203	0
Fluoride	4 mg/l	624	6	595	23
Mercury	2 µg/l	251	251	0	0
Nitrate (N)	10 mg/l	624	342	208	74
Selenium	50 µg/l	562	501	60	1
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	624	5	585	34
Copper	1 mg/l	567	289	278	0
Fluoride	2 mg/l	624	6	490	128
Iron	0.3 mg/l	576	429	94	53
Manganese	50 µg/l	575	211	342	22
Sulfate	300 mg/l	624	0	529	95
Dissolved Solids	1000 mg/l	624	0	509	115
Zinc	5 mg/l	566	195	370	1
Radioactivity					
Gross Alpha	15 pCi/l	11	0	10	1

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 33. Ambient Monitoring Groundwater Quality Data West Texas Blosons Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	40	10	20	10
Barium	2 mg/l	40	0	40	0
Cadmium	5 µg/l	40	37	3	0
Chromium	100 µg/l	40	7	33	0
Fluoride	4 mg/l	43	0	35	8
Mercury	2 µg/l	8	8	0	0
Nitrate (N)	10 mg/l	43	4	26	13
Selenium	50 µg/l	40	29	11	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	43	0	43	0
Copper	1 mg/l	40	9	31	0
Fluoride	2 mg/l	43	0	22	21
Iron	0.3 mg/l	40	34	5	1
Manganese	50 µg/l	40	19	21	0
Sulfate	300 mg/l	43	0	40	3
Dissolved Solids	1000 mg/l	43	0	36	7
Zinc	5 mg/l	40	9	31	0
Radioactivity					
Gross Alpha	15 pCi/l	5	0	3	2

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 34. Ambient Monitoring Groundwater Quality Data Woodbine Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	39	35	4	0
Barium	2 mg/l	39	0	39	0
Cadmium	5 µg/l	39	39	0	0
Chromium	100 µg/l	39	26	13	0
Fluoride	4 mg/l	41	1	36	4
Mercury	2 µg/l	29	29	0	0
Nitrate (N)	10 mg/l	41	32	8	1
Selenium	50 µg/l	39	36	3	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	41	0	41	0
Copper	1 mg/l	39	33	6	0
Fluoride	2 mg/l	41	1	31	9
Iron	0.3 mg/l	41	8	31	2
Manganese	50 µg/l	40	8	30	2
Sulfate	300 mg/l	41	0	34	7
Dissolved Solids	1000 mg/l	41	0	31	10
Zinc	5 mg/l	39	24	15	0
Radioactivity					
Gross Alpha	15 pCi/l	0	0	0	0

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Table 35. Ambient Monitoring Groundwater Quality Data Yegua Jackson Aquifer (2003-2013)

Parameter Groups	Maximum Contamination Limit (MCL)	Number of Wells			
		Total Wells Sampled	< MDL	< MCL (other than <MDL)	≥ MCL
Primary Constituents (dissolved phase unless noted)					
Arsenic	10 µg/l	27	21	6	0
Barium	2 mg/l	27	1	26	0
Cadmium	5 µg/l	27	27	0	0
Chromium	100 µg/l	27	9	18	0
Fluoride	4 mg/l	27	3	24	0
Mercury	2 µg/l	17	0	0	0
Nitrate (N)	10 mg/l	27	21	6	0
Selenium	50 µg/l	27	23	4	0
Secondary Constituents (dissolved phase unless noted)					
Chloride	300 mg/l	27	0	16	11
Copper	1 mg/l	27	9	18	0
Fluoride	2 mg/l	27	3	23	1
Iron	0.3 mg/l	27	14	3	10
Manganese	50 µg/l	27	1	18	8
Sulfate	300 mg/l	27	1	16	10
Dissolved Solids	1000 mg/l	27	0	13	14
Zinc	5 mg/l	27	11	16	0
Radioactivity					
Gross Alpha	15 pCi/l	13	0	12	1

Notes:

1. MDL = Method Detection Limit. The MDL is the lowest analysis value available for a particular constituent analysis at a particular sampling event. The MDL is determined by the analyzing laboratory.
2. MCL = Maximum Contamination Level. The MCL of a particular constituent is the maximum analysis level for safe drinking water. MDL's for certain constituents at certain sampling events were greater than the MCL's, and analyses from those events were not utilized when counting samples less than or greater than particular MCL's.

Regulatory Monitoring/Groundwater Contamination

Table 36. Groundwater Contamination Summary
Blaine Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	Yes	5	0	5	0	0	0	0	Gasoline, Diesel
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	Yes	3	0	0	0	3	0	0	PSH, BTEX, Crude Oil
Totals		8	0	5	0	3	0	0	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 37. Groundwater Contamination Summary
Blossom Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	Yes	4	0	2	0	0	0	2	Gasoline
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	No								
Totals		4	0	2	0	0	0	2	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 38. Groundwater Contamination Summary
Bone-Spring Victoria Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	No								
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	No								
Totals									

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 39. Groundwater Contamination Summary
Brazos River Alluvium Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	Yes	1	0	0	0	0	1	0	VOC's, TCE, Arsenic
CERCLIS (non-NPL)	Yes	3	0	2	0	0	1	0	VOC's, TPH, Chlorinated Solvents
DOD/DOE	No								
LUST	Yes	5	1	2	0	0	0	2	Gasoline, Diesel
RCRA Corrective Action	Yes	8	0	1	1	5	1	0	Metals, Chromium, TPH, VOC's
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	Yes	3	0	0	0	1	2	0	TPH, PSH, BTEX, Crude Oil, Benzene
Totals		20	1	5	1	5	3	2	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 40. Groundwater Contamination Summary
Capitan Reef Complex Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	Yes	2	0	2	0	0	0	0	Gasoline, Diesel
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	Yes	8	0	0	0	4	4	0	PSH, BTEX, Crude Oil
Totals		10	0	2	0	4	4	0	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 41. Groundwater Contamination Summary
Carrizo-Wilcox Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	Yes	6	0	0	0	0	5	1	Dioxins, Coal Tar, Metals, VOC's
CERCLIS (non-NPL)	Yes	44	12	12	1	7	2	10	VOC's, Metals, TPH, Chlorinated Solvents
DOD/DOE	No								
LUST	Yes	52	8	29	0	7	0	8	Gasoline, Diesel, Waste Oil
RCRA Corrective Action	Yes	22	4	5	1	7	4	1	Chlorinated Solvents, VOC's, Metals, TCE, Acetone, Boron
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	Yes	23	0	4	1	8	10	0	Crude Oil, BTEX, PSH
Totals		147	24	50	3	29	21	20	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 42. Groundwater Contamination Summary
Dockum Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	Yes	2	0	2	0	0	0	0	Arsenic, PAH
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	No								
RCRA Corrective Action	Yes	1	0	0	0	0	1	0	BTEX, TPH, VOC's
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	Yes	14	0	0	2	4	8	0	Crude Oil, BTEX, Chlorides
Totals		17	0	2	2	4	9	0	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 43. Groundwater Contamination Summary
Edwards (Balcones Fault Zone) Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	Yes	4	0	2	0	1	0	1	VOC's, TPH, Lead, Metals, Solvents
DOD/DOE	No								
LUST	Yes	2	1	0	0	0	0	0	Gasoline, Diesel
RCRA Corrective Action	Yes	2	0	0	0	0	1	1	Pesticides, Chlorinated Solvents
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	Yes	3	0	1	2	0	0	0	Hydrocarbons, BTEX, TPH
Totals		11	0	4	2	1	1	3	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 44. Groundwater Contamination Summary
Edwards-Trinity (Plateau) Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	Yes	6	1	2	2	0	2	0	Chromium, TCE, PCB
CERCLIS (non-NPL)	Yes	7	0	3	0	1	1	0	VOC's, TPH, Metals, Chlorinated Solvents
DOD/DOE	No								
LUST	Yes	14	1	9	0	3	0	1	Gasoline, Diesel, BTEX, TPH, Jet Fuel
RCRA Corrective Action	Yes	8	0	3	0	1	2	2	VOC's, BTEX, TPH, Chromium, Metals
Underground Injection	No								
State Sites*	Yes	1	0	0	0	1	0	0	VOC's
Non-point Sources	No								
Oil/Gas Activities	Yes	26	0	1	2	12	10	1	Crude Oil, BTEX, PSH, Mercury
Totals		62	2	18	4	18	15	4	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 45. Groundwater Contamination Summary
Edwards-Trinity (High Plains) Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	No								
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	No								
Totals									

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 46. Groundwater Contamination Summary
Ellenberger-San Saba Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	No								
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	No								
Totals									

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 47. Groundwater Contamination Summary
Gulf Coast Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	Yes	39	2	3	5	1	28	0	Metals, VOC's, Arsenic
CERCLIS (non-NPL)	Yes	447	26	182	6	71	55	55	VOC's, Arsenic, Metals, Chlorinated Solvents
DOD/DOE	No								
LUST	Yes	397	50	233	0	30	0	83	Gasoline, Diesel
RCRA Corrective Action	Yes	209	8	60	31	60	36	11	VOC's, BTEX, TPH, Chlorinated Solvents
Underground Injection	No								
State Sites*	Yes	17	0	10	0	4	0	1	VOC's, Arsenic, Metals
Non-point Sources	No								
Oil/Gas Activities	Yes	189	8	34	70	35	37	0	PSH, BTEX, Crude Oil
Totals		1,298	94	522	112	201	156	150	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 48. Groundwater Contamination Summary
Hickory Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	No								
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	No								
Totals									

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 49. Groundwater Contamination Summary
Hueco-Mesilla Bolson Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	Yes	1	0	0	0	0	0	1	PCE
CERCLIS (non-NPL)	Yes	3	0	2	1	0	0	0	VOC's, Chlorinated Solvents, Metals
DOD/DOE	No								
LUST	Yes	22	1	15	0	5	0	1	Gasoline, Diesel
RCRA Corrective Action	Yes	13	1	7	0	3	1	1	VOC's, BTEX, Arsenic, MTBE
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	No								
Totals		39	2	24	1	8	1	3	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 50. Groundwater Contamination Summary
Igneous Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	Yes	1	0	1	0	0	0	0	Nitrate
DOD/DOE	No								
LUST	No								
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	No								
Totals		1	0	1	0	0	0	0	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 51. Groundwater Contamination Summary
Lipan Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	Yes	4	0	0	0	1	2	0	VOC's, Nitrate, TPH, TCE, Metals
DOD/DOE	No								
LUST	Yes	13	1	6	0	4	0	2	Gasoline, Diesel
RCRA Corrective Action	Yes	6	0	4	0	1	1	0	VOC's, Arsenic, Pesticides, TCE
Underground Injection	No								
State Sites*	Yes	1	0	0	1	0	0	0	VOC's
Non-point Sources	No								
Oil/Gas Activities	No								
Totals		24	1	10	0	7	3	2	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 52. Groundwater Contamination Summary
Marathon Aquifer (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	No								
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	No								
Totals									

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 53. Groundwater Contamination Summary
Marble Falls Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	No								
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	No								
Totals									

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 54. Groundwater Contamination Summary
Nacatoch Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	Yes	1	0	1	0	0	0	0	Chromium
CERCLIS (non-NPL)	Yes	2	0	0	0	0	1	1	VOC's, Metals, Chlorinated Solvents
DOD/DOE	No								
LUST	Yes	8	2	5	0	1	0	0	Gasoline, Diesel
RCRA Corrective Action	Yes	1	0	1	0	0	0	0	Metals, BTEX, TCE
Underground Injection	No								
State Sites*	Yes	1	0	1	0	0	0	0	VOC's
Non-point Sources	No								
Oil/Gas Activities	No								
Totals		13	2	7	1	1	1	1	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 55. Groundwater Contamination Summary
Ogallala Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	Yes	11	1	4	0	1	4	0	Hexavalent Chromium, Metals, Nitrate, Arsenic
CERCLIS (non-NPL)	Yes	36	4	10	1	16	3	0	VOC's, DCE, Arsenic, Nitrate, TPH
DOD/DOE	No								
LUST	Yes	124	2	52	0	54	0	16	Gasoline, Diesel, Waste Oil
RCRA Corrective Action	Yes	49	4	11	11	12	8	1	VOC's, BTEX, TPH, Chromium, MTBE
Underground Injection	No								
State Sites*	Yes	6	0	3	1	2	0	0	VOC's, DCE, Nickel
Non-point Sources	No								
Oil/Gas Activities	Yes	63	4	1	1	27	30	0	Crude Oil, VOC's, Natural Gas, Sulfates, Chlorides
Totals		289	15	81	14	112	45	17	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 56. Groundwater Contamination Summary
Pecos Valley Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	Yes	12	0	8	0	3	0	1	Gasoline, Diesel
RCRA Corrective Action	Yes	2							VOC's, Solvents
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	Yes	22	0	0	1	7	13	1	Crude Oil, VOC's, Sulfates, Chlorides
Totals		36	0	8	1	10	13	2	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 57. Groundwater Contamination Summary
Queen City Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	Yes	6	0	2	2	0	2	0	Arsenic, Chromium, Benzene, Metals
CERCLIS (non-NPL)	Yes	19	0	13	0	3	1	2	VOC's, Solvents, MTBE, Metals, TPH
DOD/DOE	No								
LUST	Yes	73	5	39	0	15	0	14	Gasoline, Diesel
RCRA Corrective Action	Yes	30	2	11	4	9	4	0	VOC's, BTEX, TPH, Metals, Chromium
Underground Injection	No								
State Sites*	Yes	1	0	1	0	0	0	0	VOC's
Non-point Sources	No								
Oil/Gas Activities	Yes	12	0	5	0	3	3	1	Crude Oil, BTEX, TPH, PCB
Totals		141	7	71	6	30	10	17	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 58. Groundwater Contamination Summary
Rita Blanca Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	No								
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	No								
Totals									

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 59. Groundwater Contamination Summary
Rustler Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	No								
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	No								
Totals									

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 60. Groundwater Contamination Summary
Seymour Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	Yes	3	0	1	0	0	1	1	VOC's, Metals, TPH, Solvents
DOD/DOE	No								
LUST	Yes	27	2	16	0	9	0	0	Gasoline, Diesel, Waste Oil
RCRA Corrective Action	Yes	5	0	1	1	1	2	0	VOC's, MTBE, TPH, Metals, Solvents
Underground Injection	No								
State Sites*	Yes	1	0	1	0	0	0	0	VOC's
Non-point Sources	No								
Oil/Gas Activities	Yes	8	0	0	0	8	0	0	Crude Oil, PSH, BTEX, TPH
Totals		44	2	19	1	18	3	1	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 61. Groundwater Contamination Summary
Sparta Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	Yes	2	1	0	0	1	0	0	Chlorinated Solvents, Metals
DOD/DOE	No								
LUST	Yes	3	0	2	0	0	0	1	Gasoline, Diesel
RCRA Corrective Action	Yes	4	1	0	1	1	1	0	Nitrate, Chlorinated Solvents
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	Yes	1	0	0	0	1	0	0	Crude Oil
Totals		10	2	2	1	3	1	1	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 62. Groundwater Contamination Summary
Trinity Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	Yes	1	0	0	1	0	0	0	
CERCLIS (non-NPL)	Yes	10	2	3	0	0	1	2	VOC's, Metals, Nitrate, TPH, Solvents
DOD/DOE	No								
LUST	Yes	35	4	25	0	4	0	4	Gasoline, Diesel, Waste Oil
RCRA Corrective Action	Yes	9	2	0	2	4	1	0	TPH, BTEX, Gasoline, Metals, MTBE
Underground Injection	No								
State Sites*	Yes	4	0	2	1	1	0	0	VOC's, Metals, Barium, Ammonia
Non-point Sources	No								
Oil/Gas Activities	Yes	9	1	0	0	5	3	0	Crude Oil, PSH, BTEX, TPH
Totals		68	9	30	4	14	5	6	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 63. Groundwater Contamination Summary
West Texas Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	No								
DOD/DOE	No								
LUST	No								
RCRA Corrective Action	No								
Underground Injection	No								
State Sites*	No								
Non-point Sources	No								
Oil/Gas Activities	No								
Totals									

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 64. Groundwater Contamination Summary
Woodbine Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	Yes	26	0	6	1	3	4	5	VOC's, TCE, BTEX, Metals
DOD/DOE	No								
LUST	Yes	27	2	17	0	0	0	10	Gasoline, Diesel
RCRA Corrective Action	Yes	7	1	0	2	3	1	0	PCE, TCE, BTEX, MTBE, VOC's
Underground Injection	No								
State Sites*	Yes	2	0	1	0	1	0	0	VOC's
Non-point Sources	No								
Oil/Gas Activities	No								
Totals		62	3	24	3	7	5	15	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Table 65. Groundwater Contamination Summary
Yegua-Jackson Aquifer Outcrop (2012)

Source Type	Documented Groundwater Contamination Present in Reporting Area	Number of Sites With Confirmed Groundwater Contamination	Site Activity Status						Contaminants
			Contamination Confirmation	Ongoing Investigation	Corrective Action Planning	Corrective Action Implemented	Monitoring of Corrective Action	Action Completed	
NPL	No								
CERCLIS (non-NPL)	Yes	12	1	6	0	1	3	0	VOC's, BTEX, MTBE, Metals, Solvents
DOD/DOE	No								
LUST	Yes	19	2	11	0	1	0	5	Gasoline, Diesel, Waste Oil
RCRA Corrective Action	Yes	14	0	5	3	3	3	0	VOC's, PCP, Acetone, Arsenic, Pesticides, Metals
Underground Injection	No								
State Sites*	Yes	2	0	1	0	1	0	0	TCE, PCE, Metals
Non-point Sources	No								
Oil/Gas Activities	Yes	6	0	1	1	2	1	0	PSH, BTEX, TPH
Totals		53	3	24	4	8	7	5	

NPL - National Priority List
DOE - Department of Energy
LUST - Leaking Underground Storage Tanks
*These sites may be combined with NPL sites

CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOD - Department of Defense
RCRA - Resource Conservation and Recovery Act

Constituents of concern in selected Texas aquifers

Figure 3. Distribution of Nitrate in the Blaine Aquifer

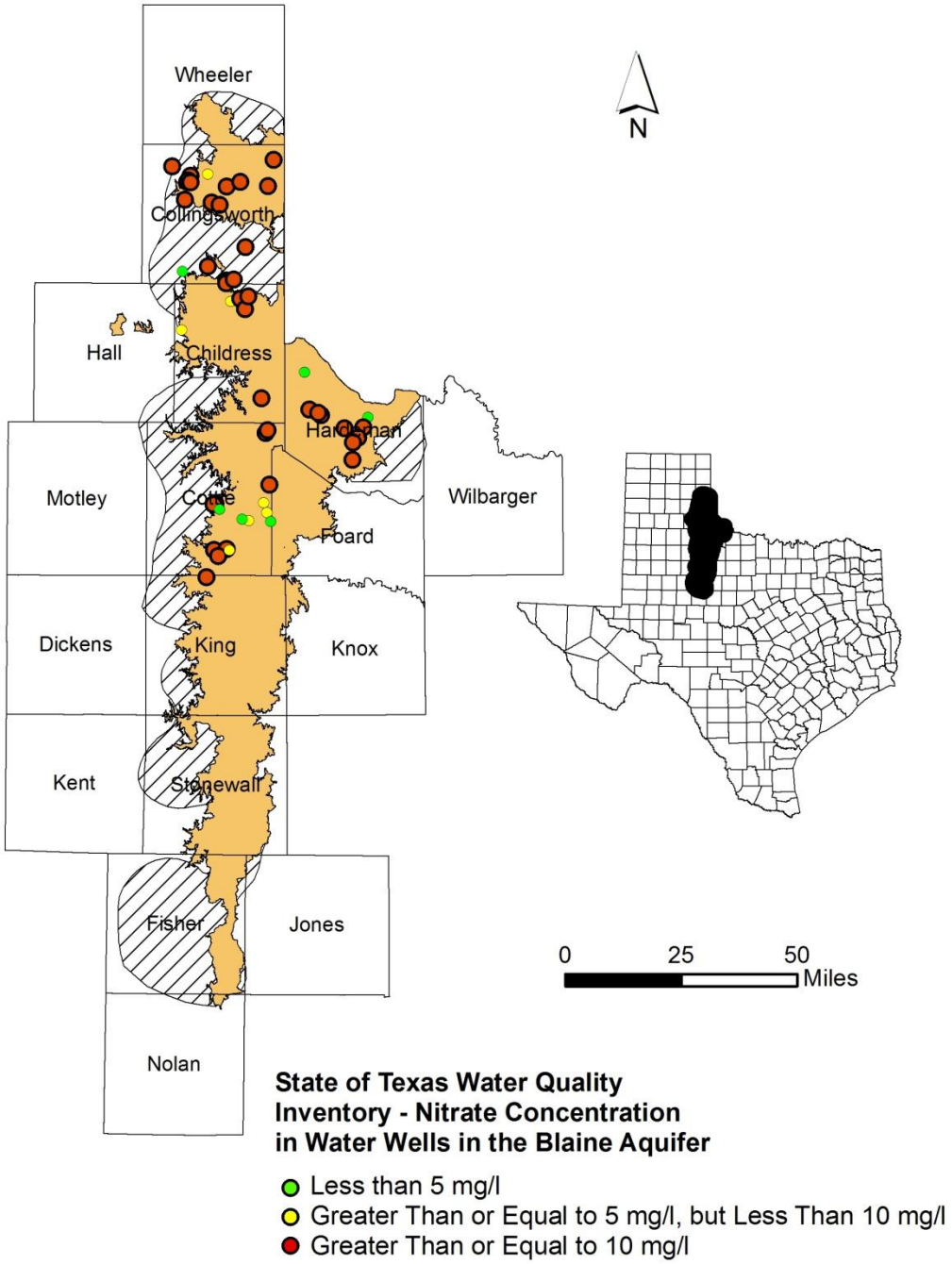


Figure 4. Distribution of Selenium in the Blaine Aquifer

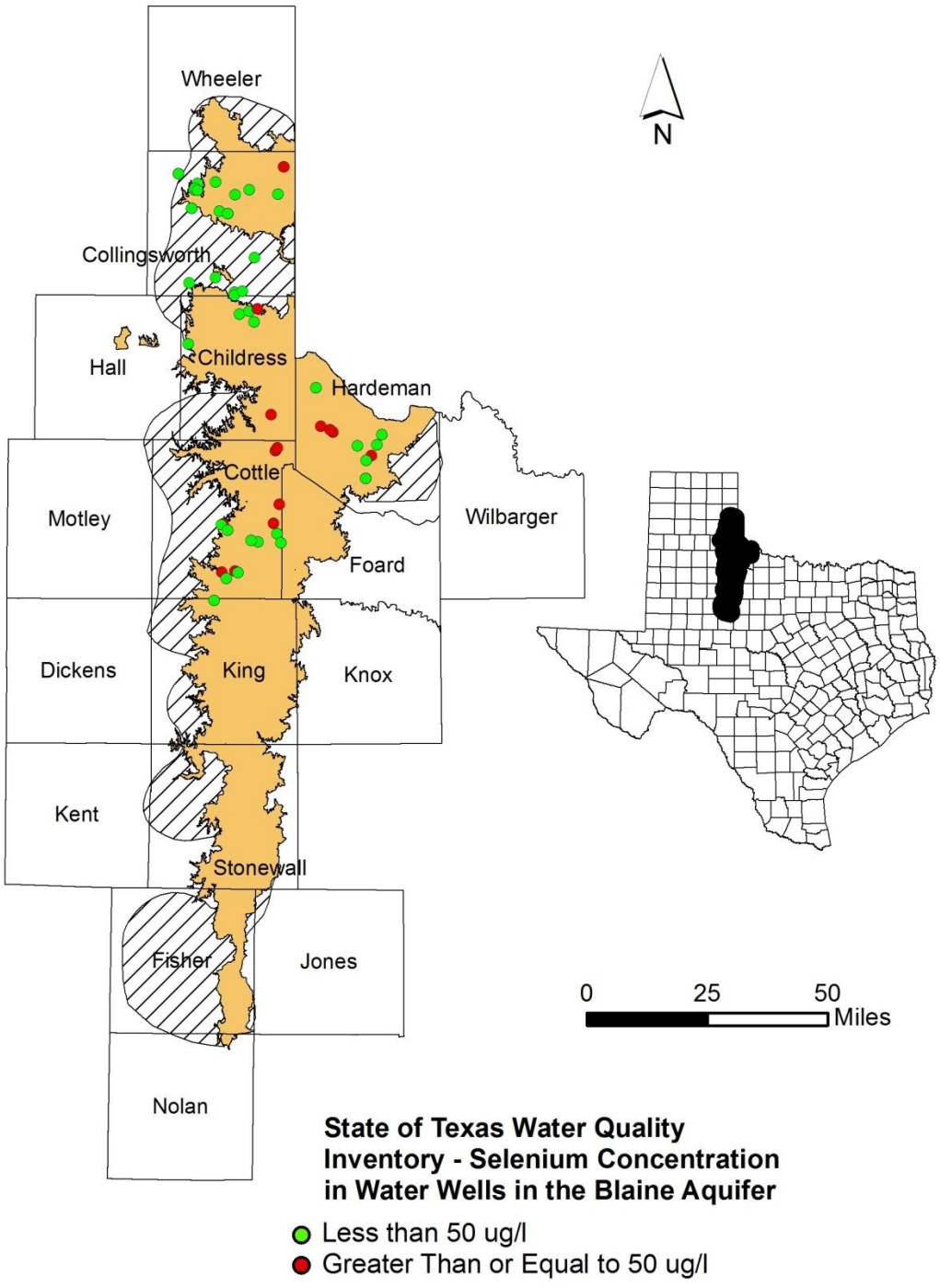


Figure 5. Distribution of Nitrate in the Carrizo - Wilcox Aquifer

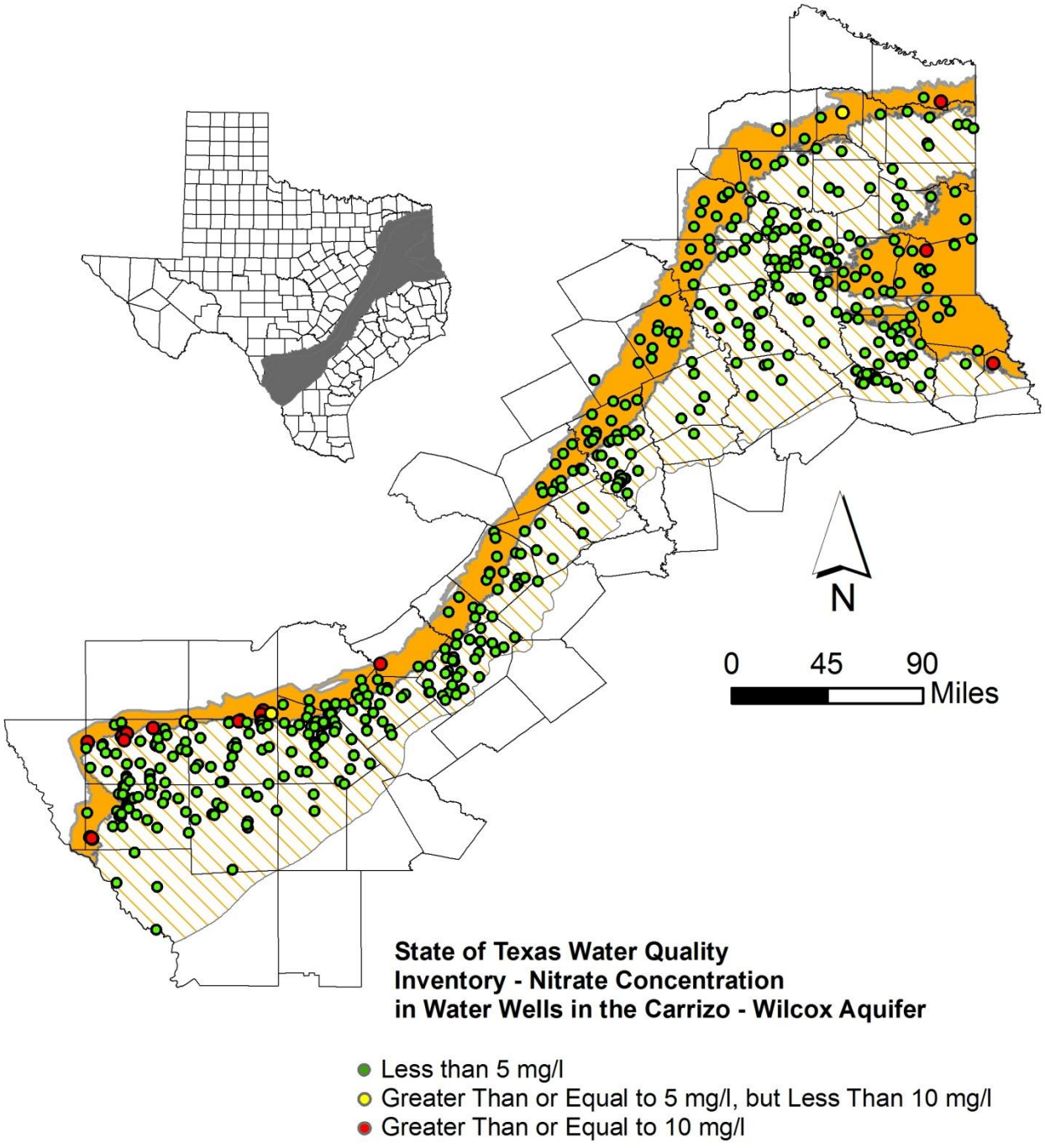


Figure 6. Distribution of Nitrate in the Dockum Aquifer

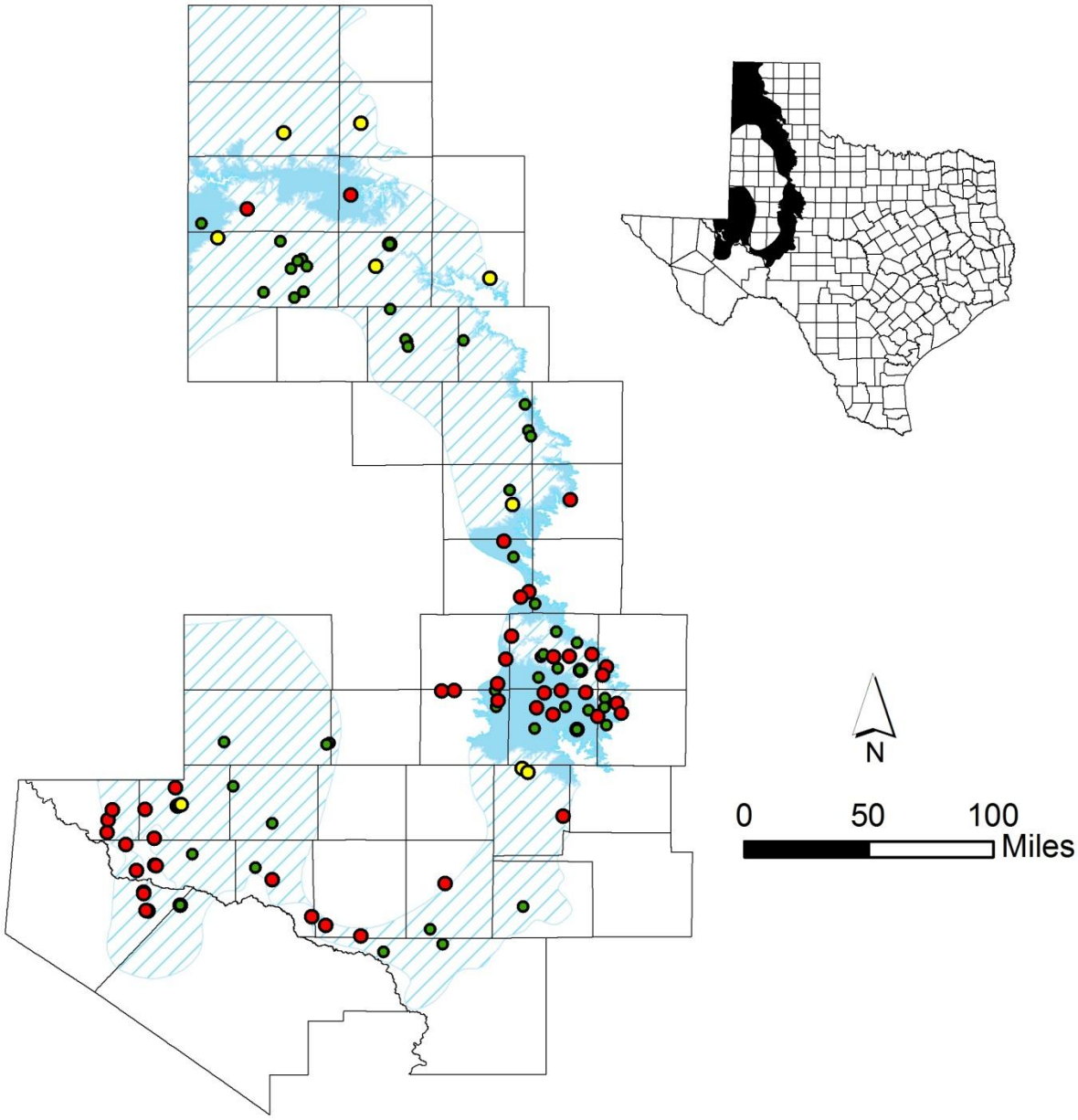


Figure 7. Distribution of Arsenic in the Dockum Aquifer

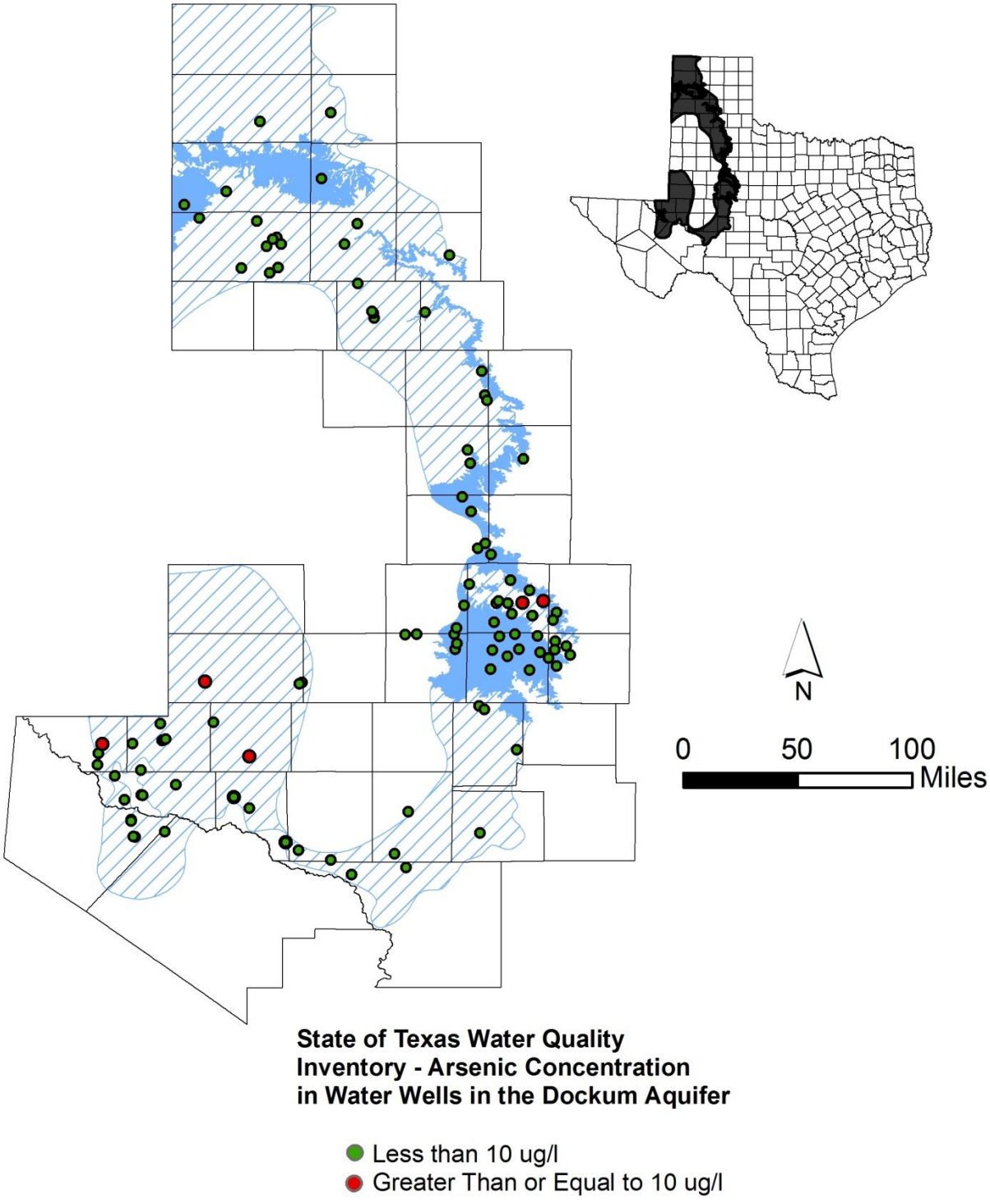


Figure 8. Distribution of Radionuclide in the Dockum Aquifer

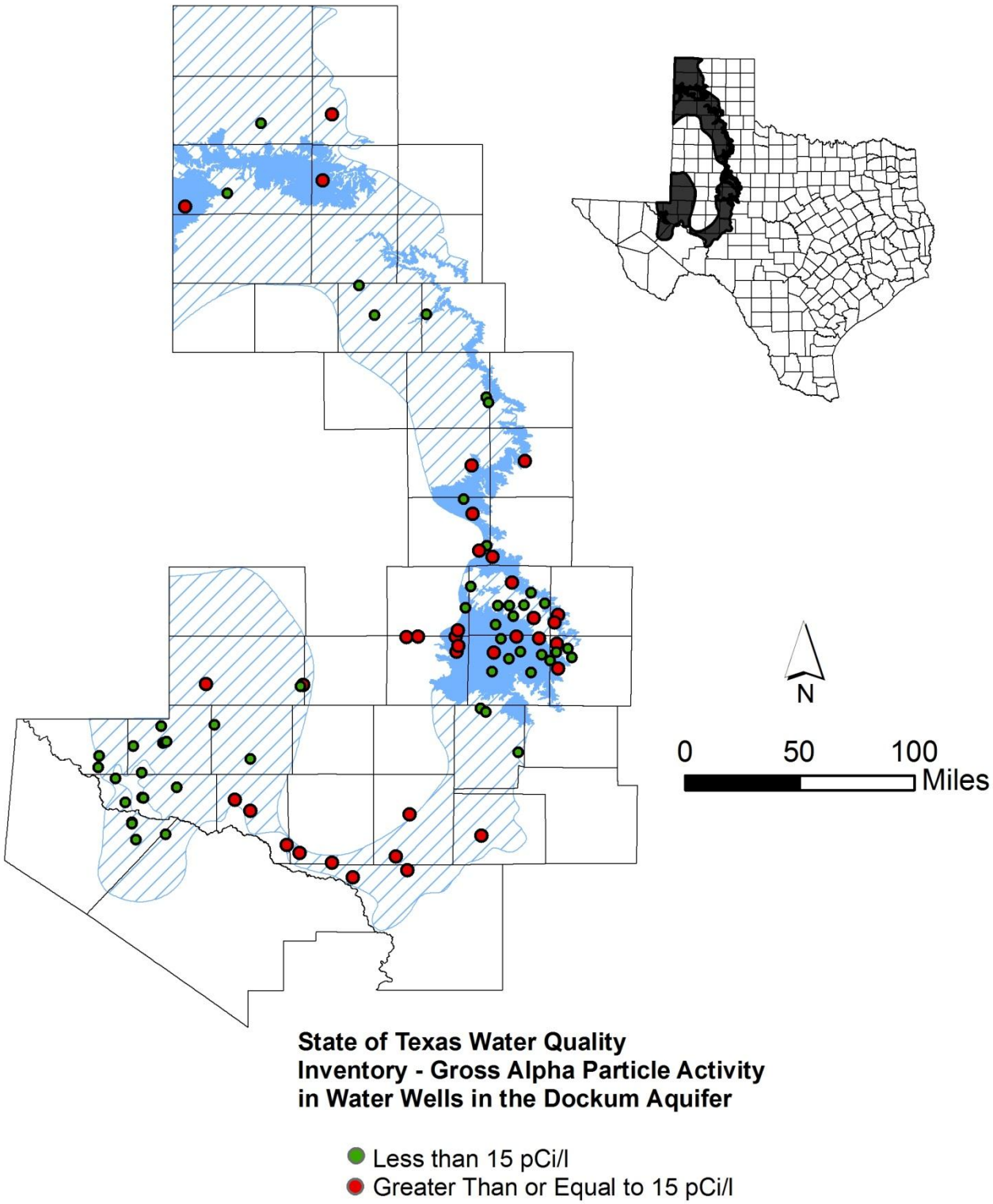


Figure 9. Distribution of Arsenic in the Edwards Aquifer

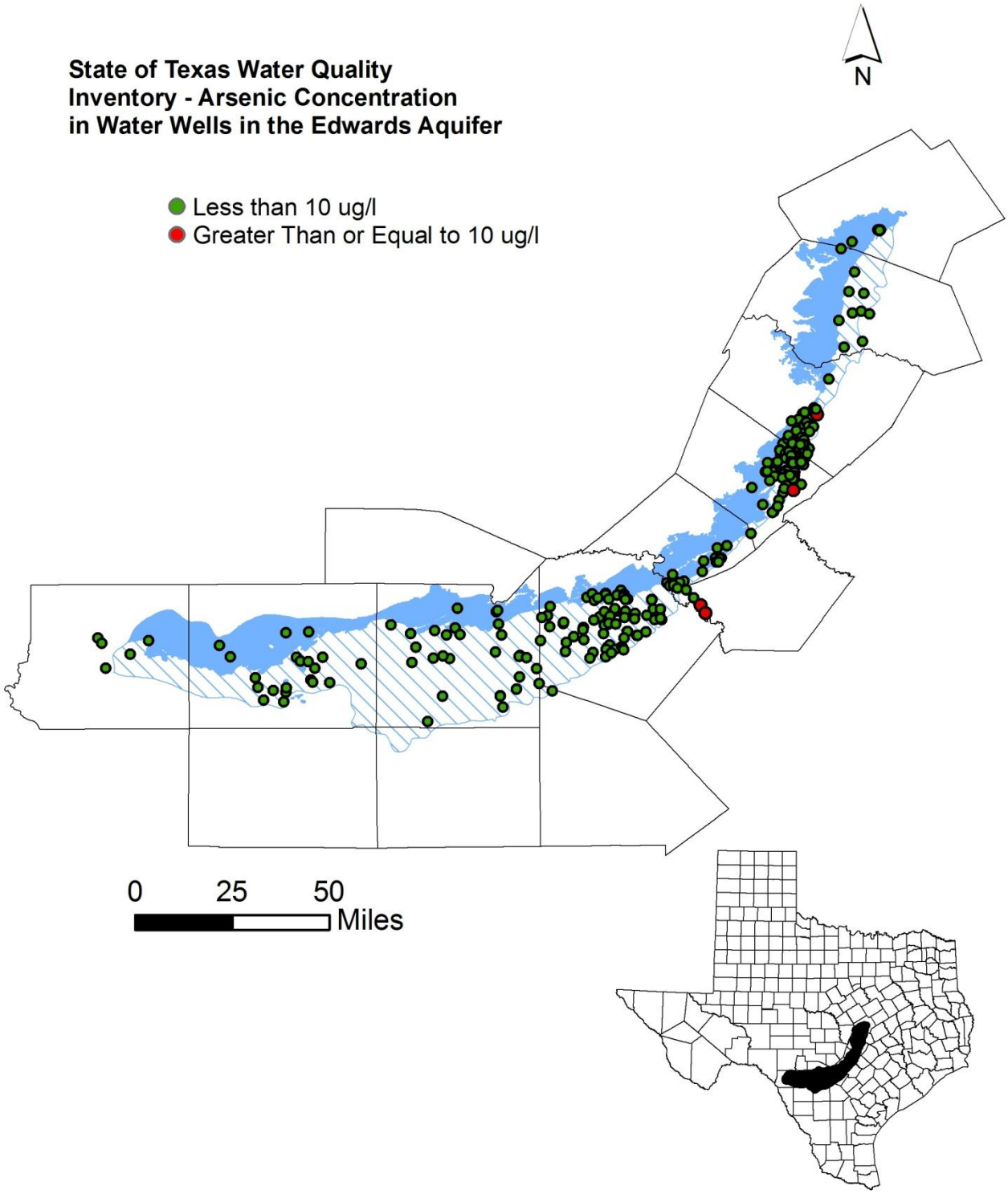


Figure 10. Distribution of Fluoride in the Edwards Aquifer

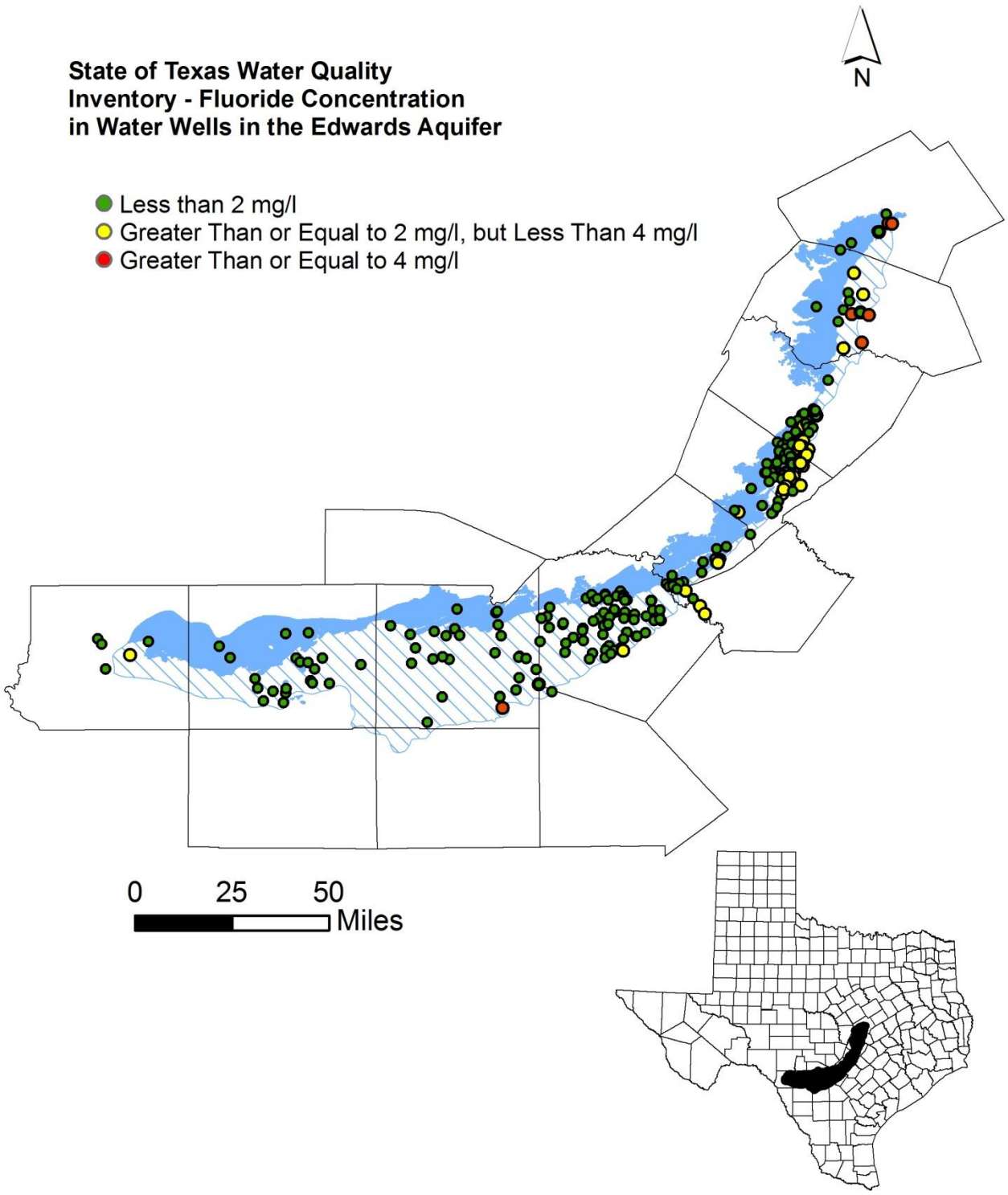


Figure 11. Distribution of Nitrate in the Edwards Aquifer

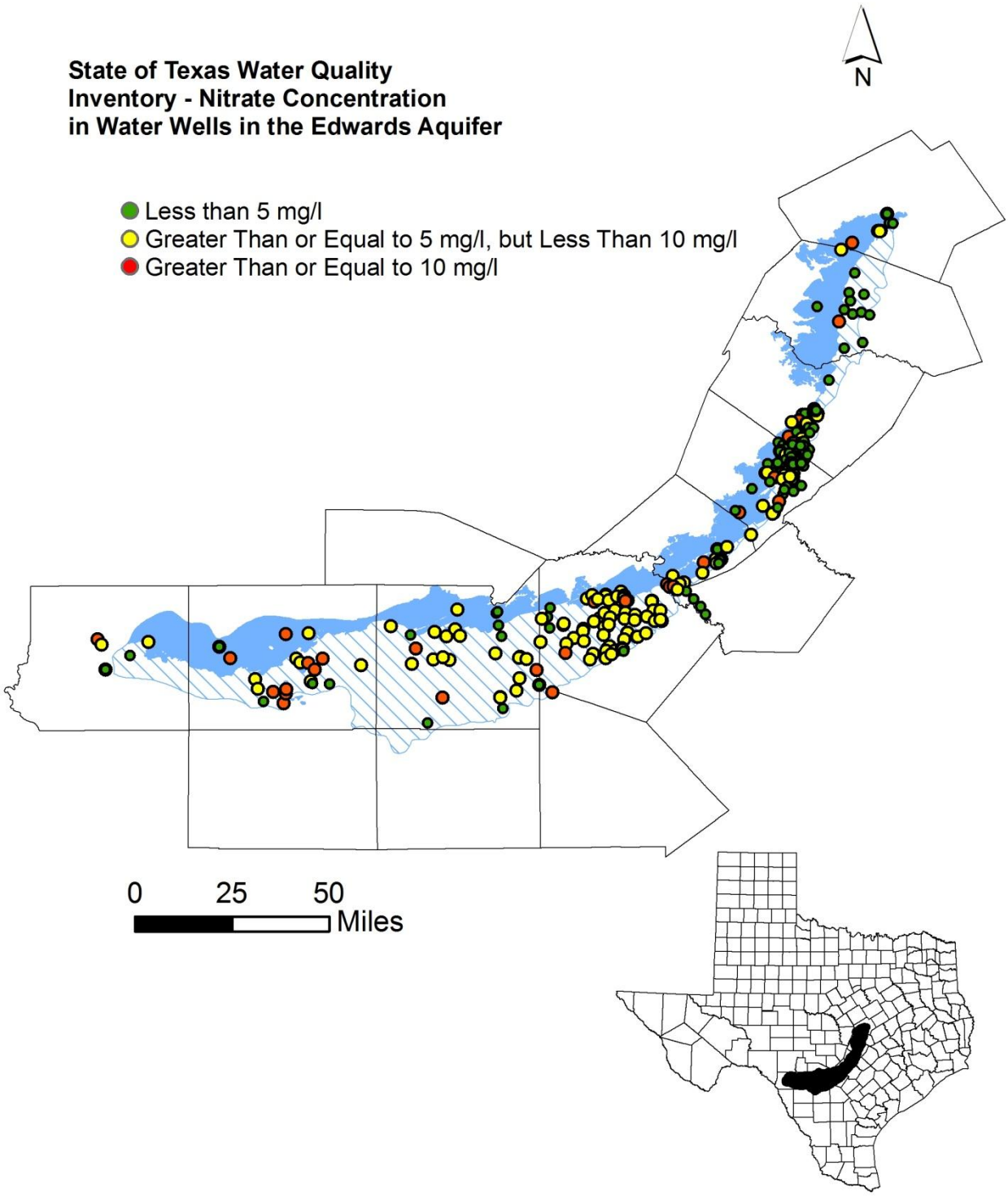


Figure 12. Distribution of Selenium in the Edwards Aquifer

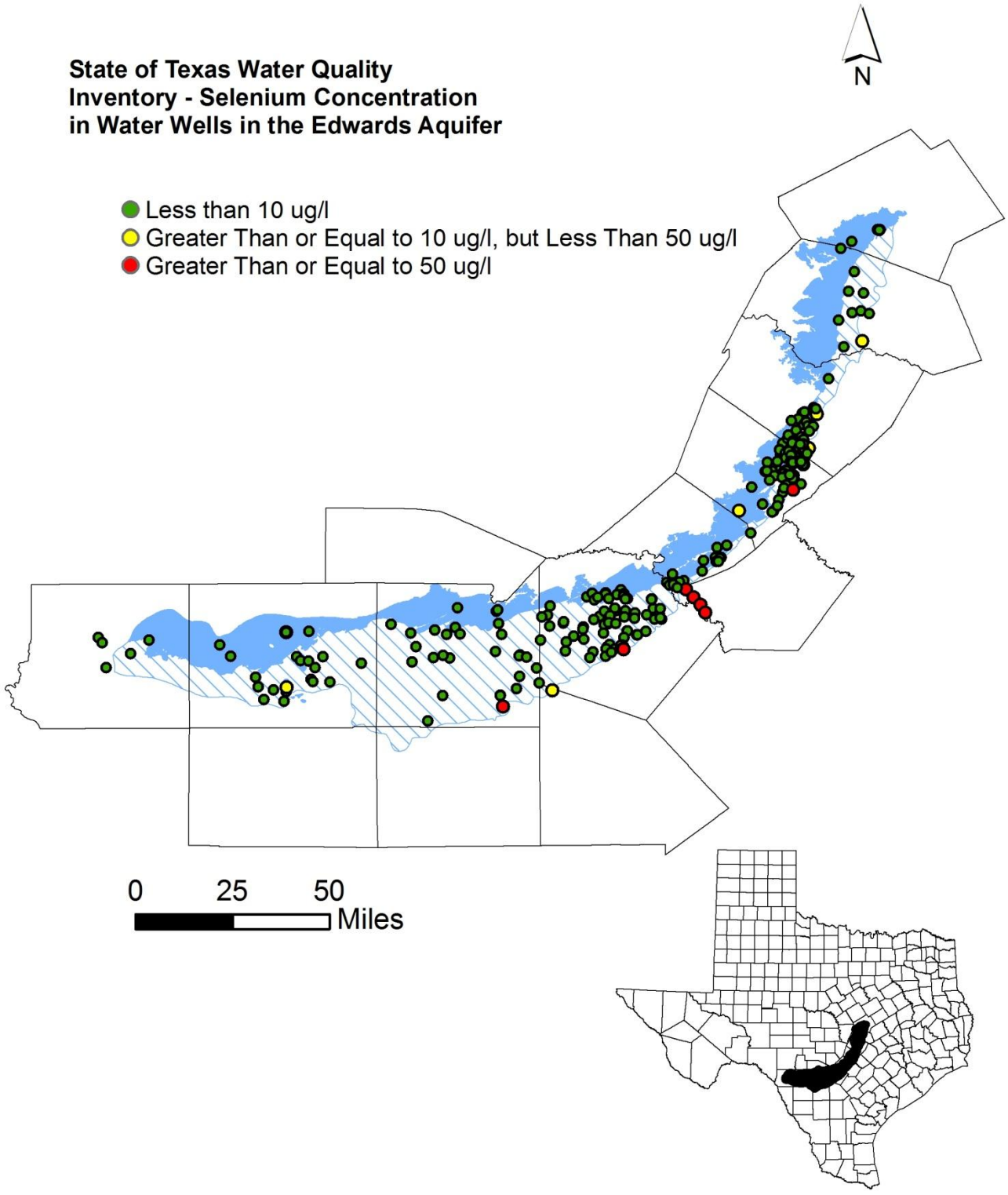


Figure 13. Distribution of Arsenic in the Edwards – Trinity Plateau Aquifer

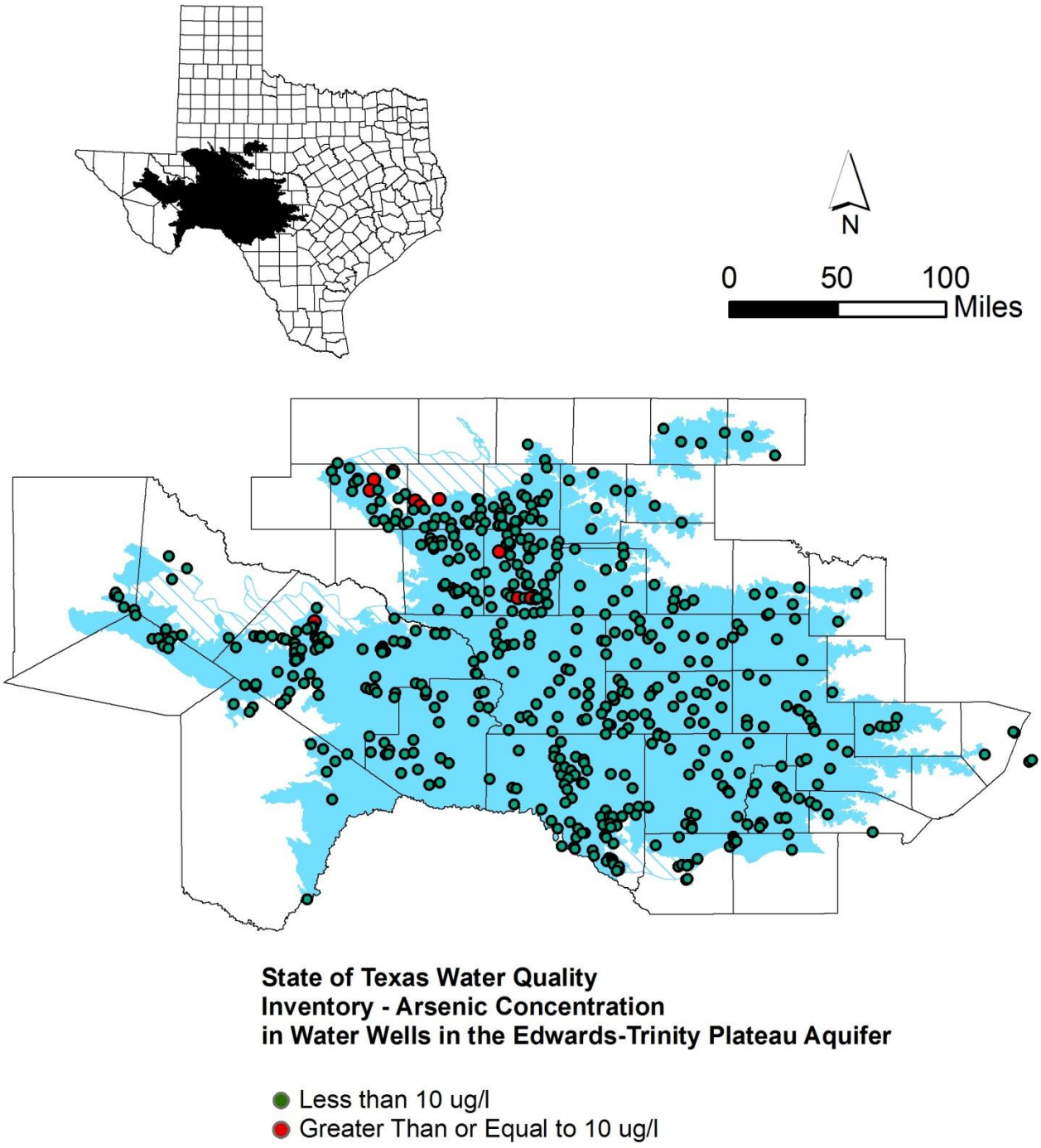


Figure 14. Distribution of Fluoride in the Edwards – Trinity Plateau Aquifer

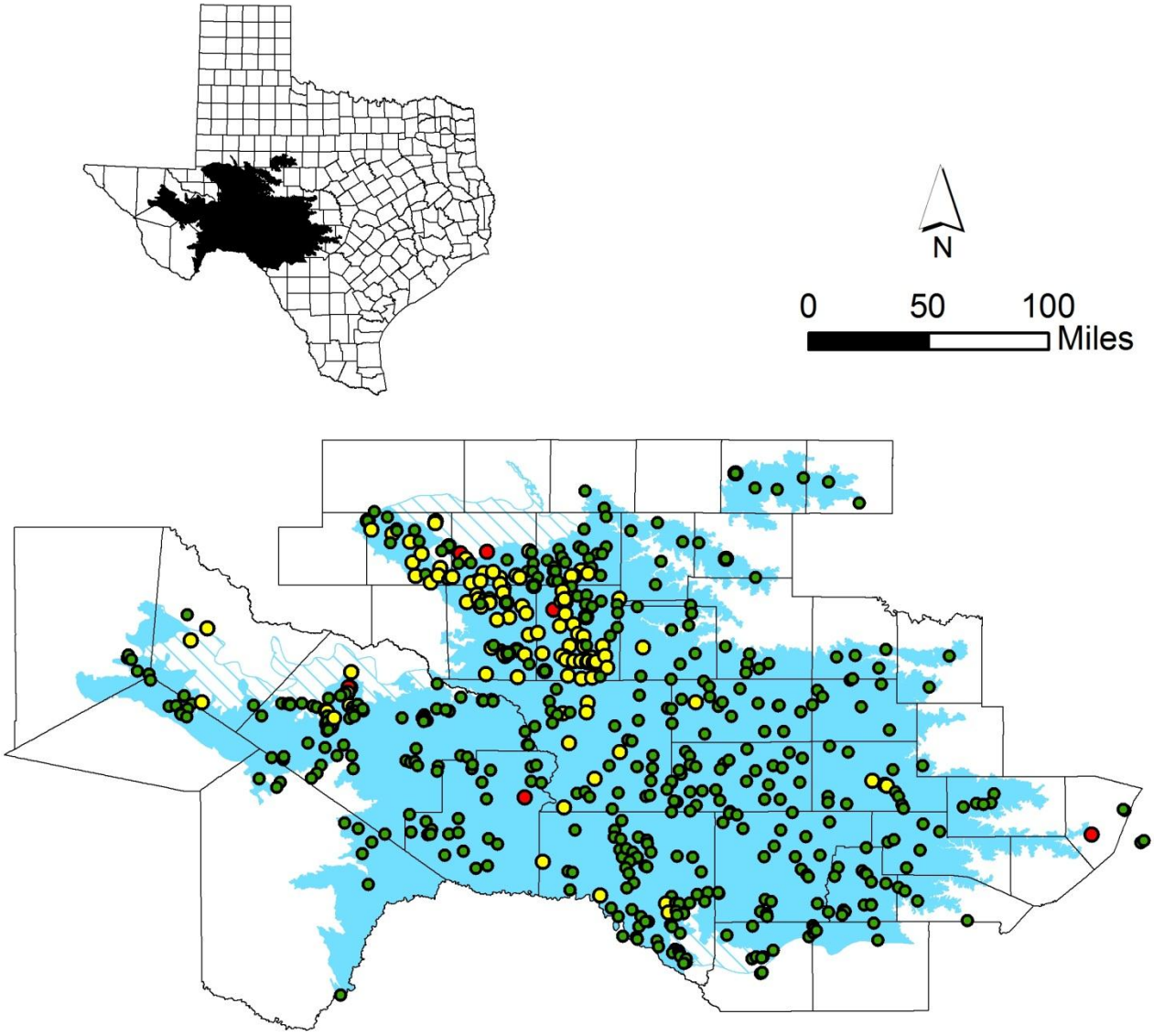


Figure 15. Distribution of Nitrate in the Edwards – Trinity Plateau Aquifer

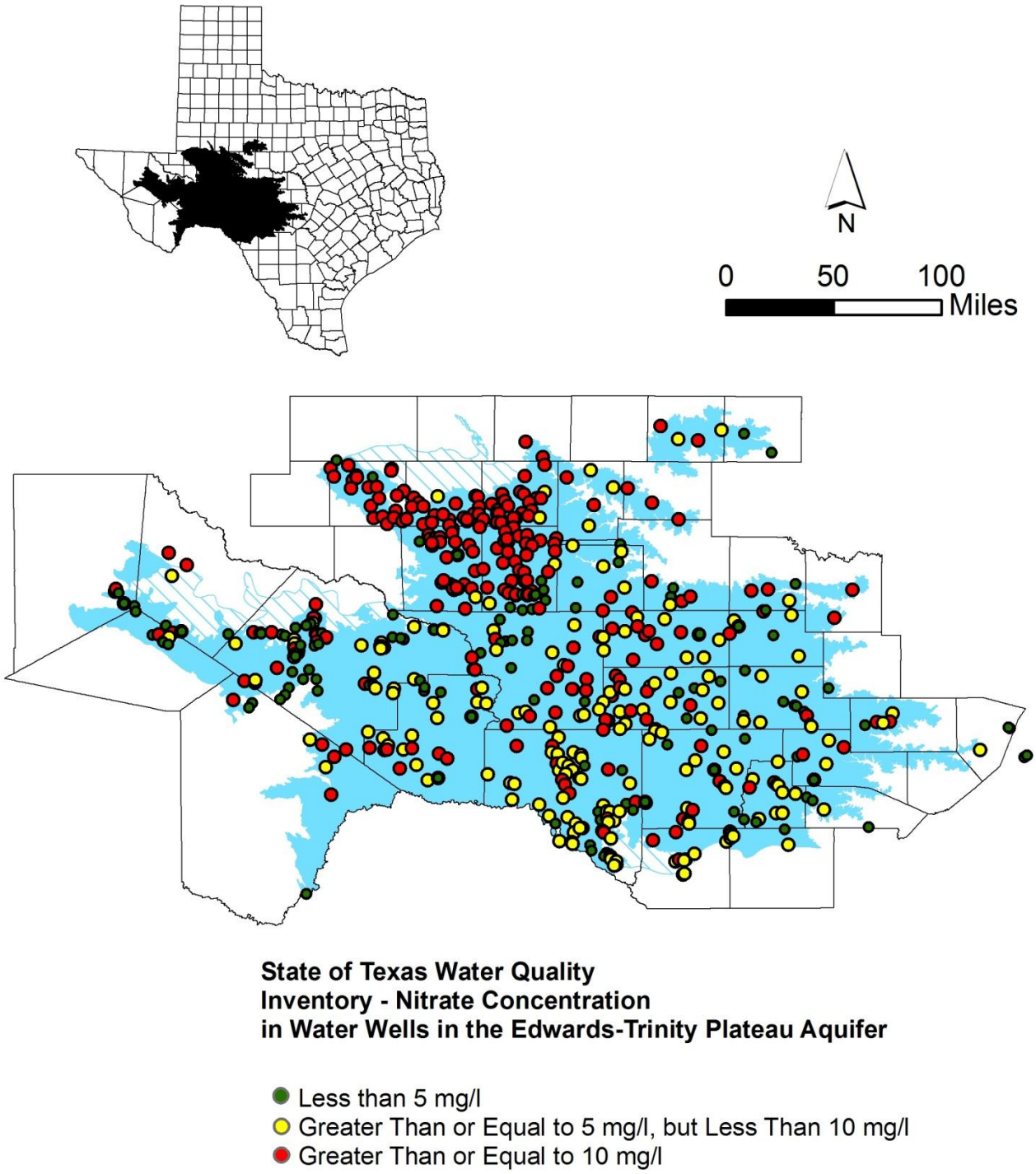
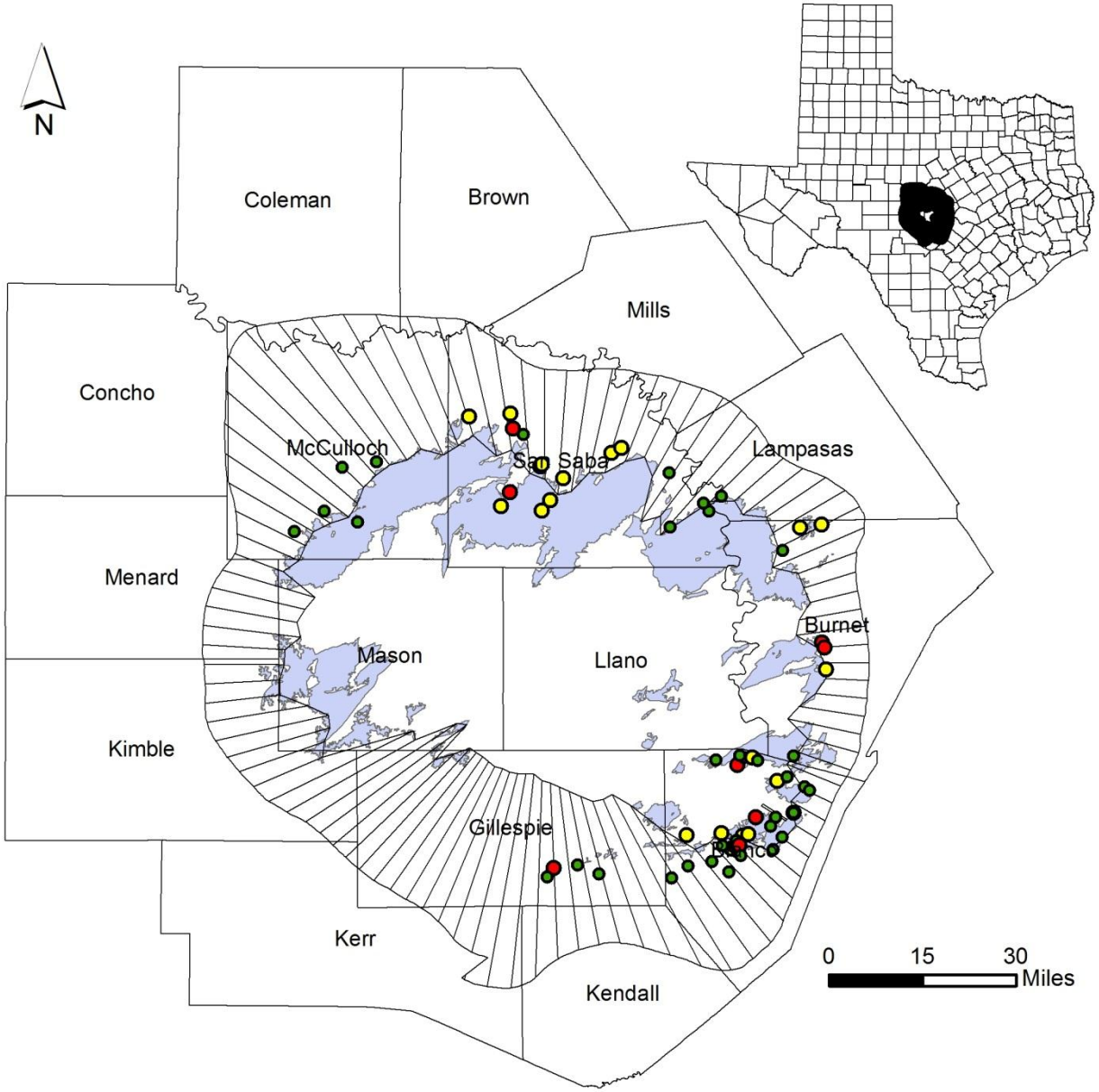


Figure 16. Distribution of Nitrate in the Ellenburger – San Saba Aquifer



State of Texas Water Quality Inventory - Nitrate Concentration in Water Wells in the Ellenburger - San Saba Aquifer

- Less than 5 mg/l
- Greater Than or Equal to 5 mg/l, but Less Than 10 mg/l
- Greater Than or Equal to 10 mg/l

Figure 17. Distribution of Radionuclide in the Ellenburger – San Saba Aquifer

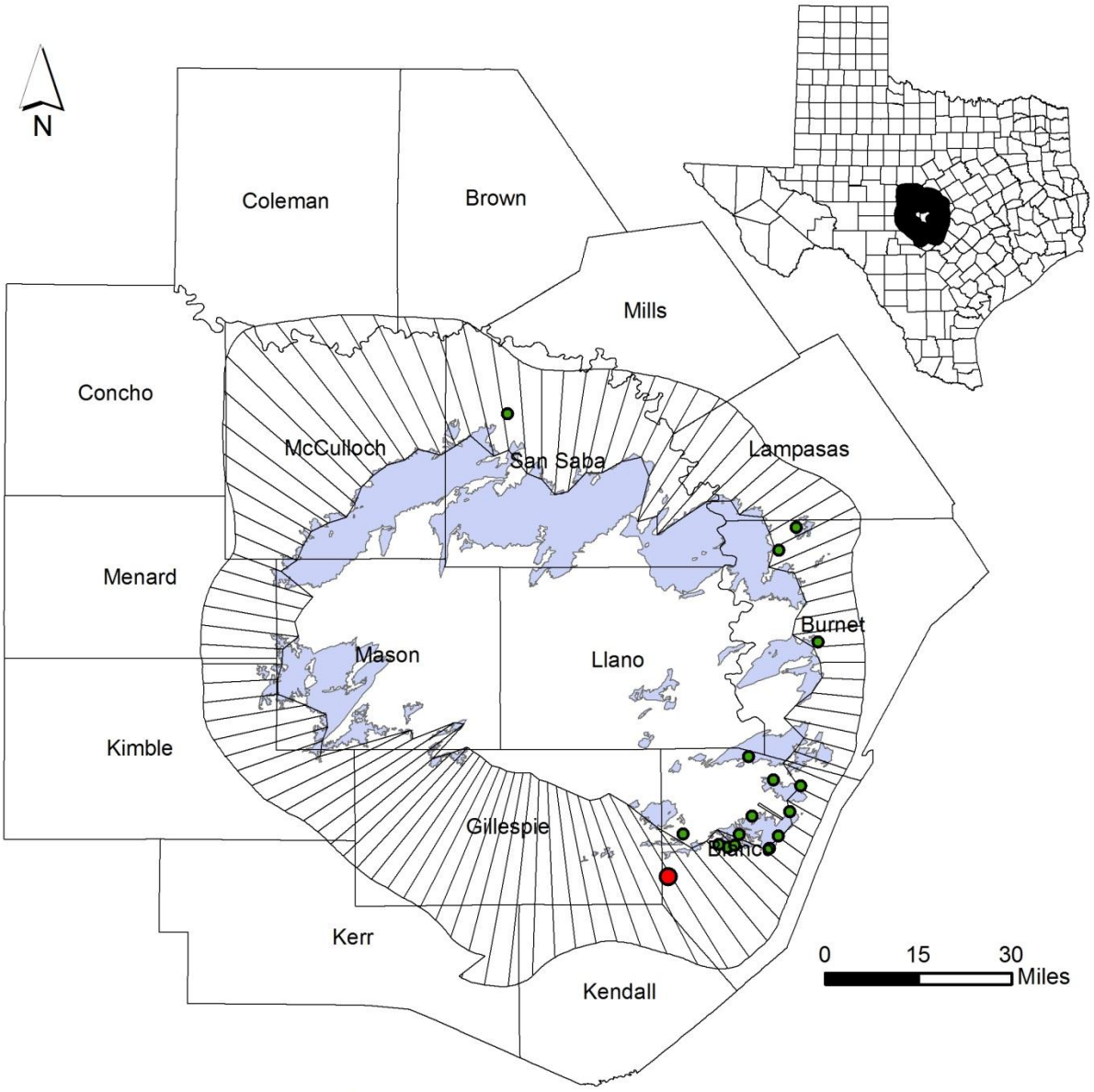


Figure 18. Distribution of Arsenic in the Gulf Coast Aquifer

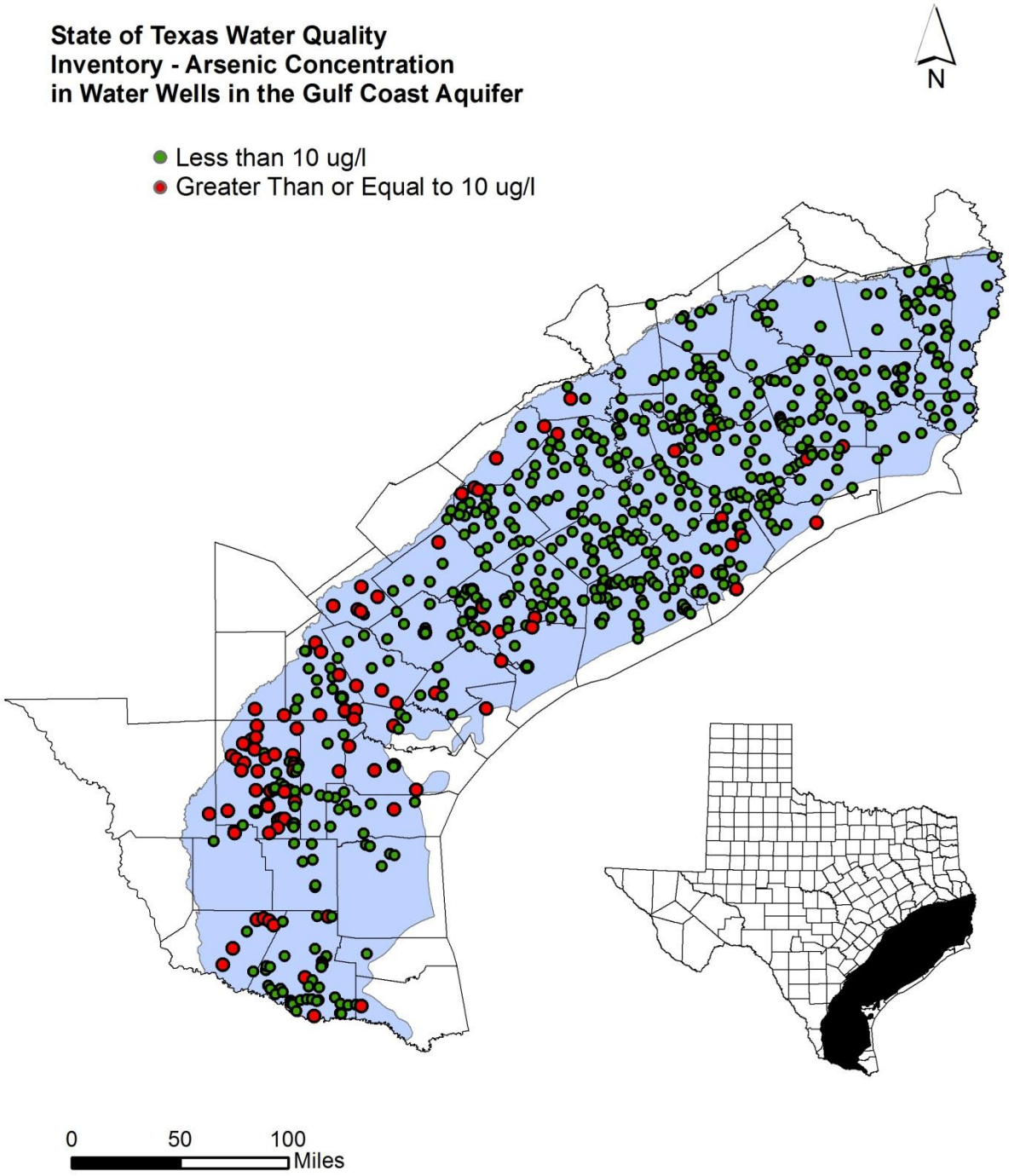


Figure 19. Distribution of Manganese in the Gulf Coast Aquifer

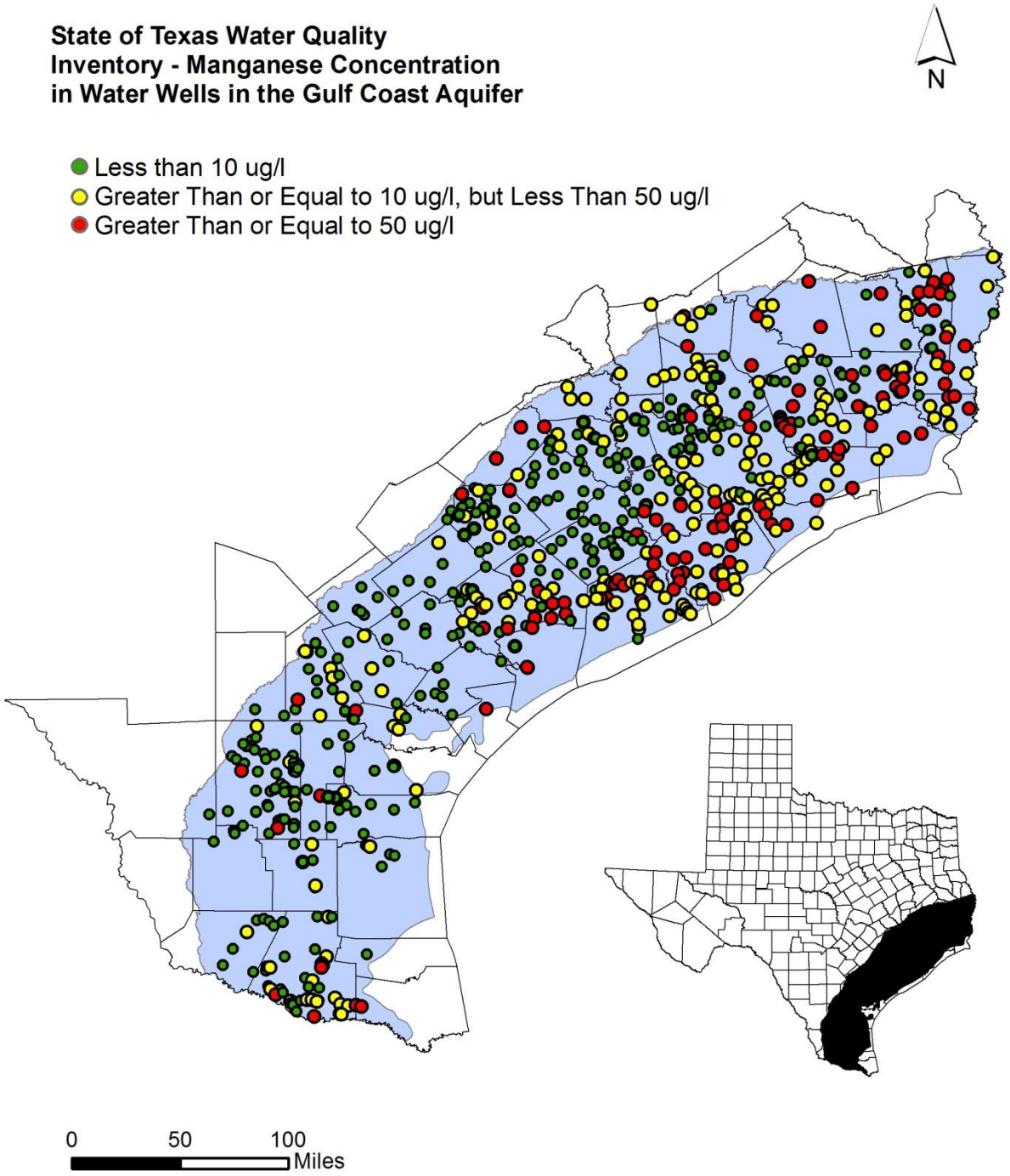


Figure 20. Distribution of Nitrate in the Gulf Coast Aquifer

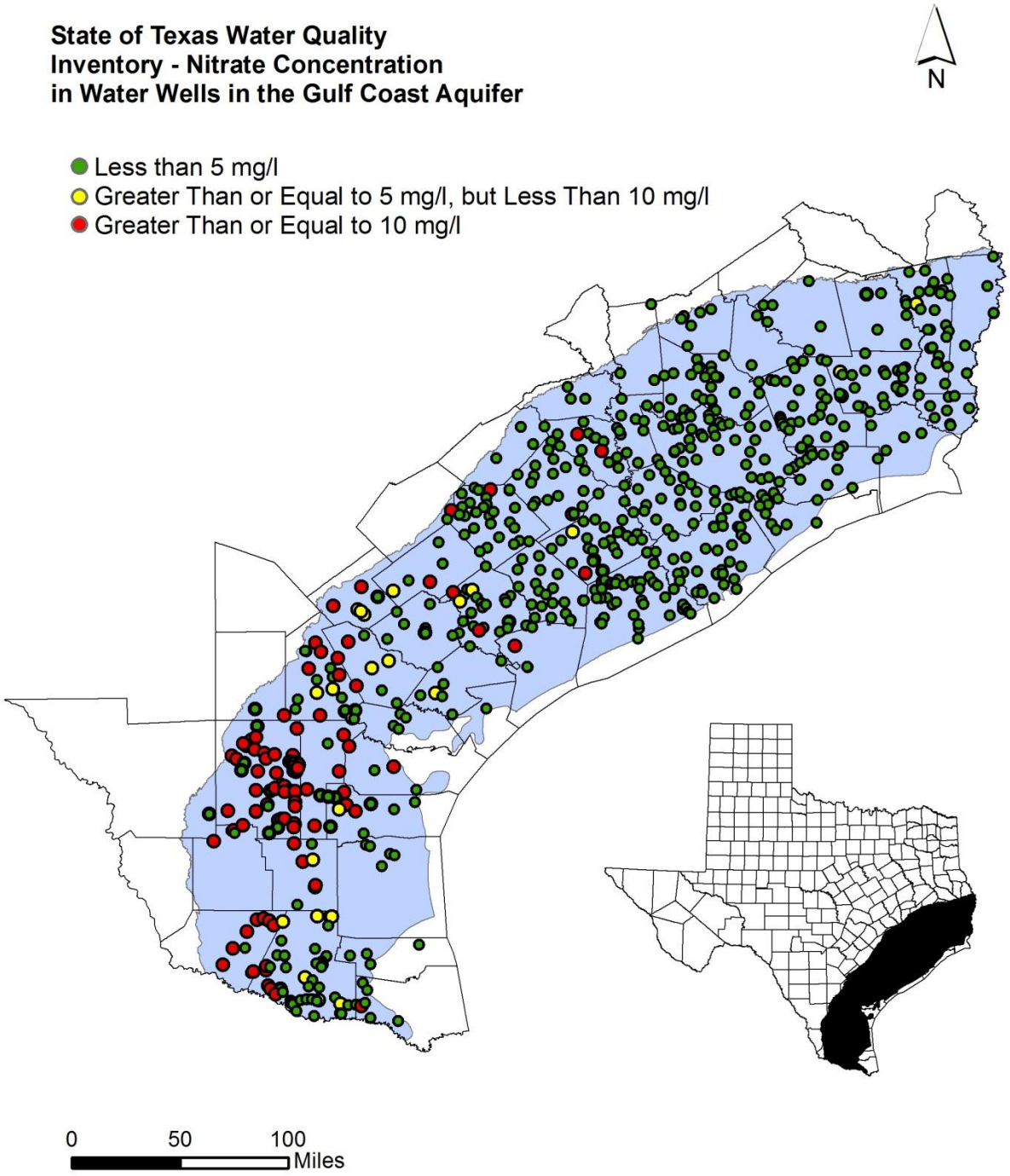


Figure 21. Distribution of Radionuclide in the Gulf Coast Aquifer

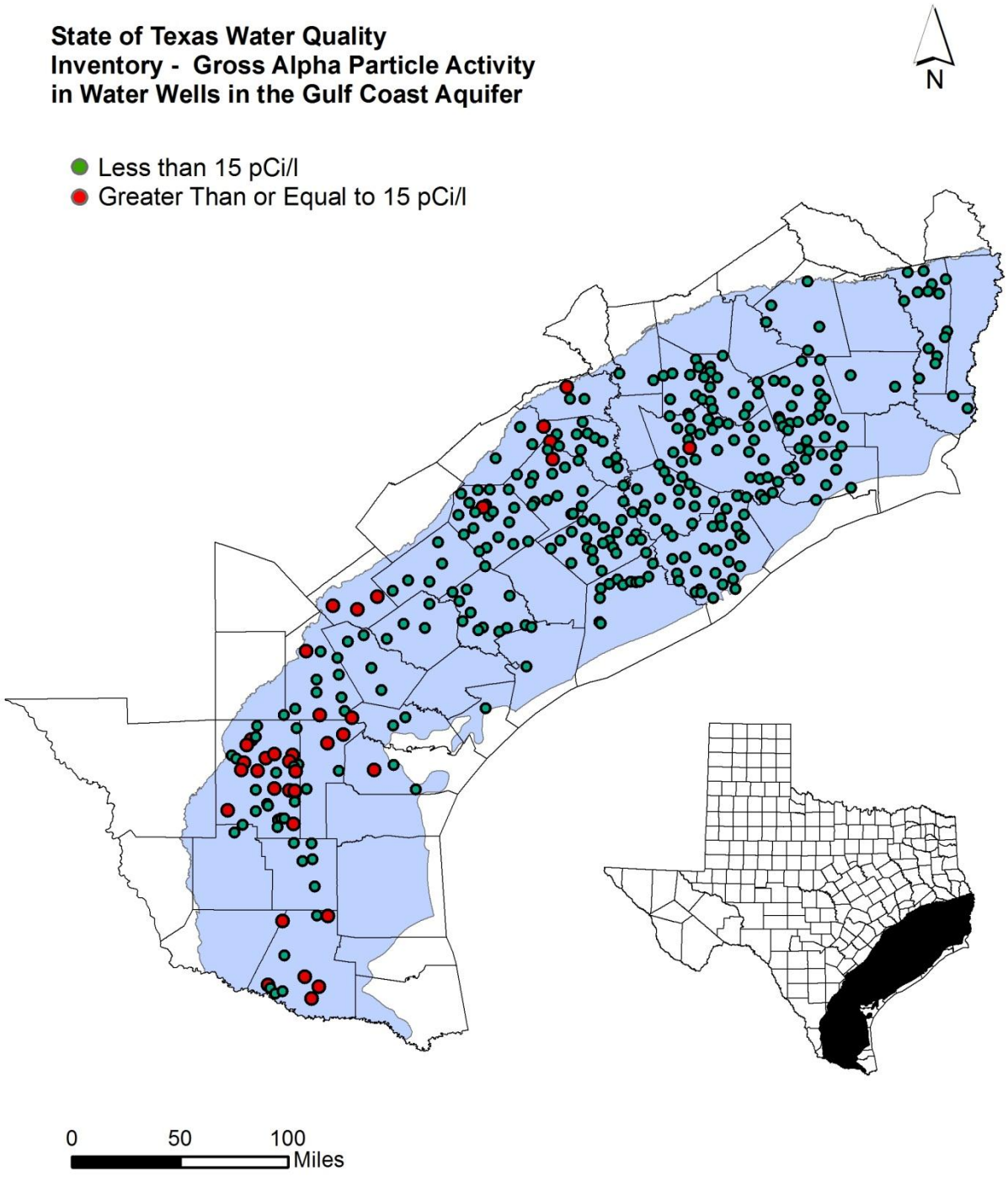
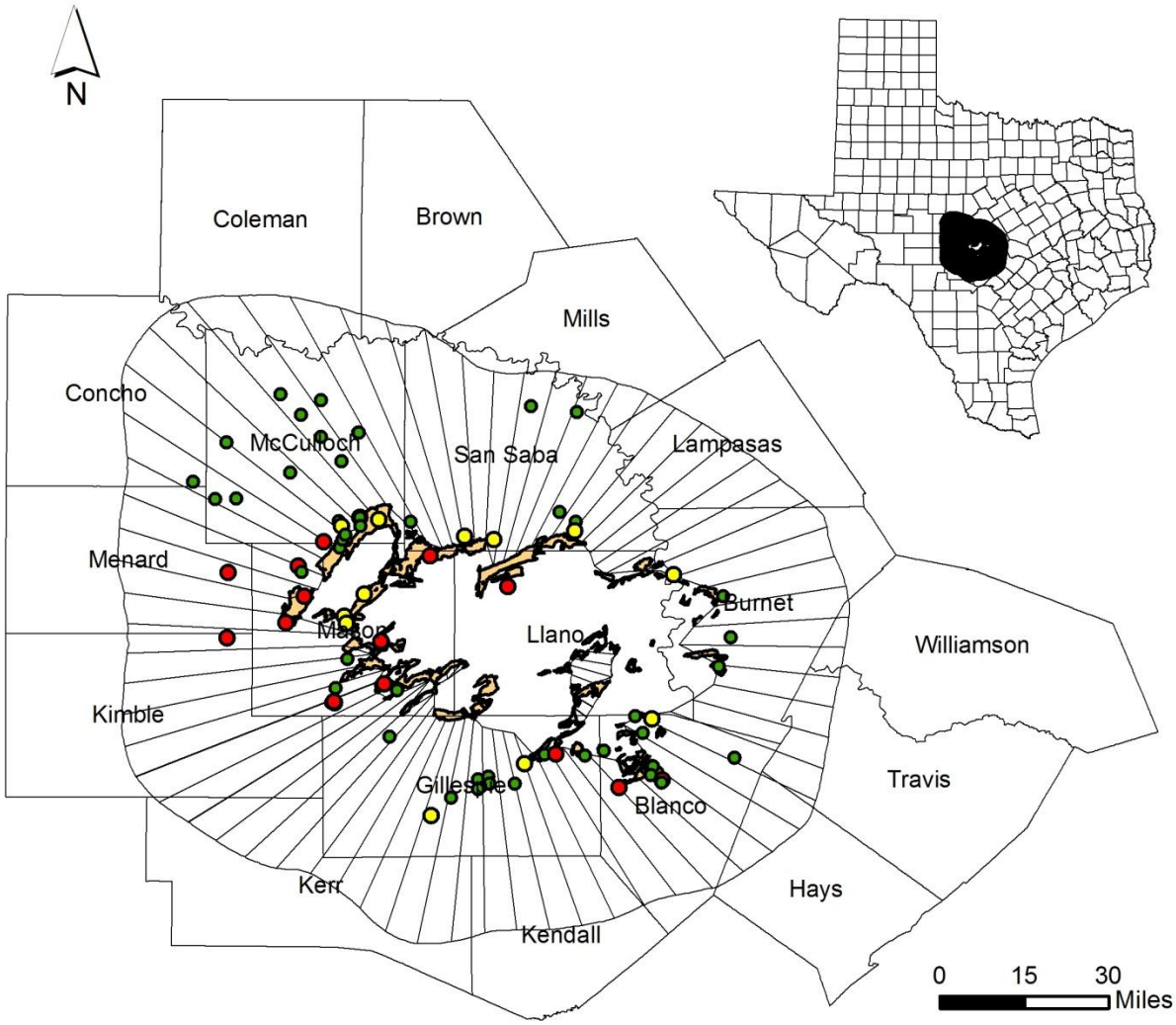


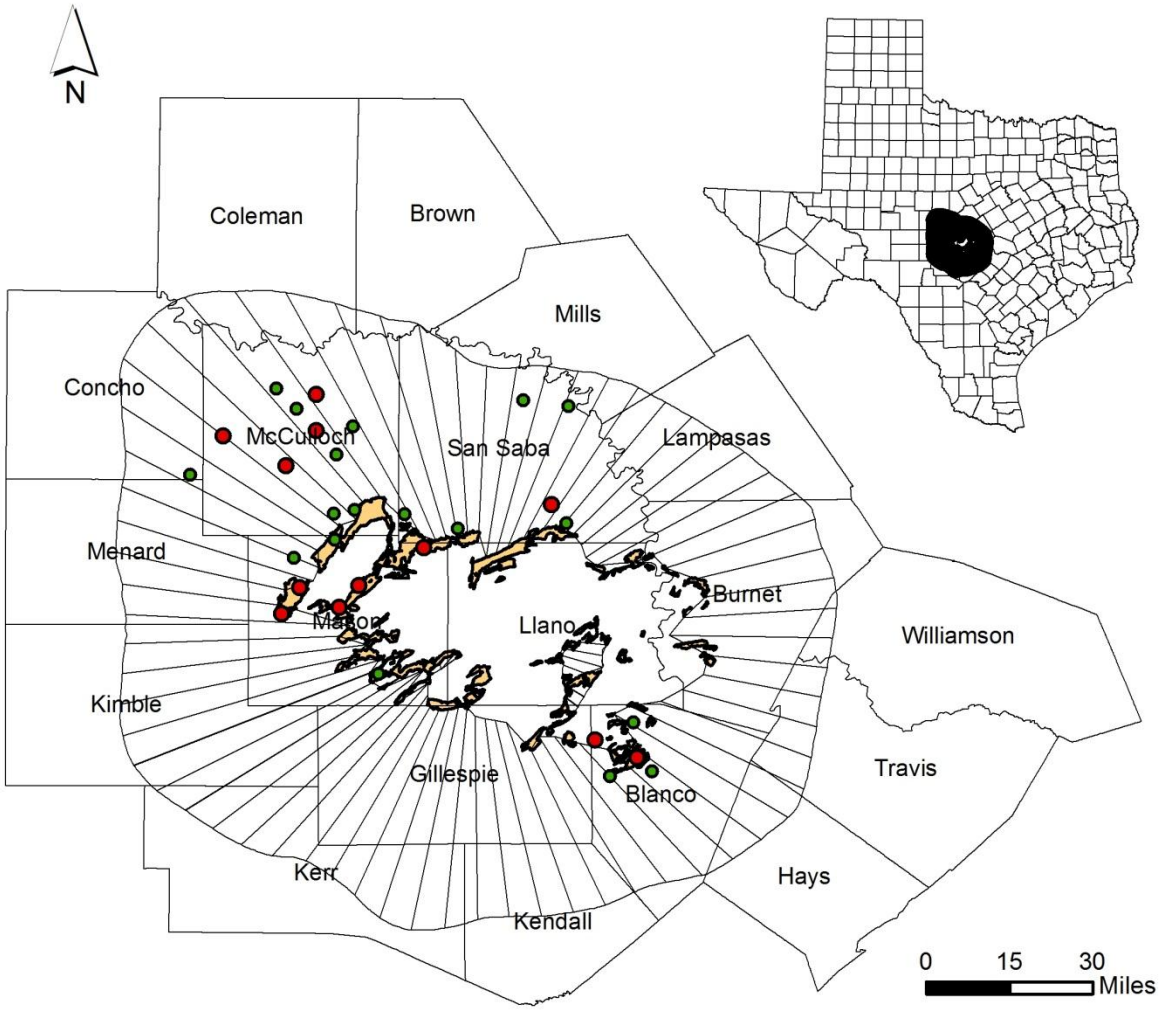
Figure 22. Distribution of Nitrate in the Hickory Aquifer



State of Texas Water Quality Inventory - Nitrate Concentration in Water Wells in the Hickory Aquifer

- Less than 5 mg/l
- Greater Than or Equal to 5 mg/l, but Less Than 10 mg/l
- Greater Than or Equal to 10 mg/l

Figure 23. Distribution of Radionuclide in the Hickory Aquifer



State of Texas Water Quality Inventory - Gross Alpha Particle Activity in Water Wells in the Hickory Aquifer

- Less than 15 pCi/l
- Greater Than or Equal to 15 pCi/l

Figure 24. Distribution of Arsenic in the Hueco-Bolson Aquifer

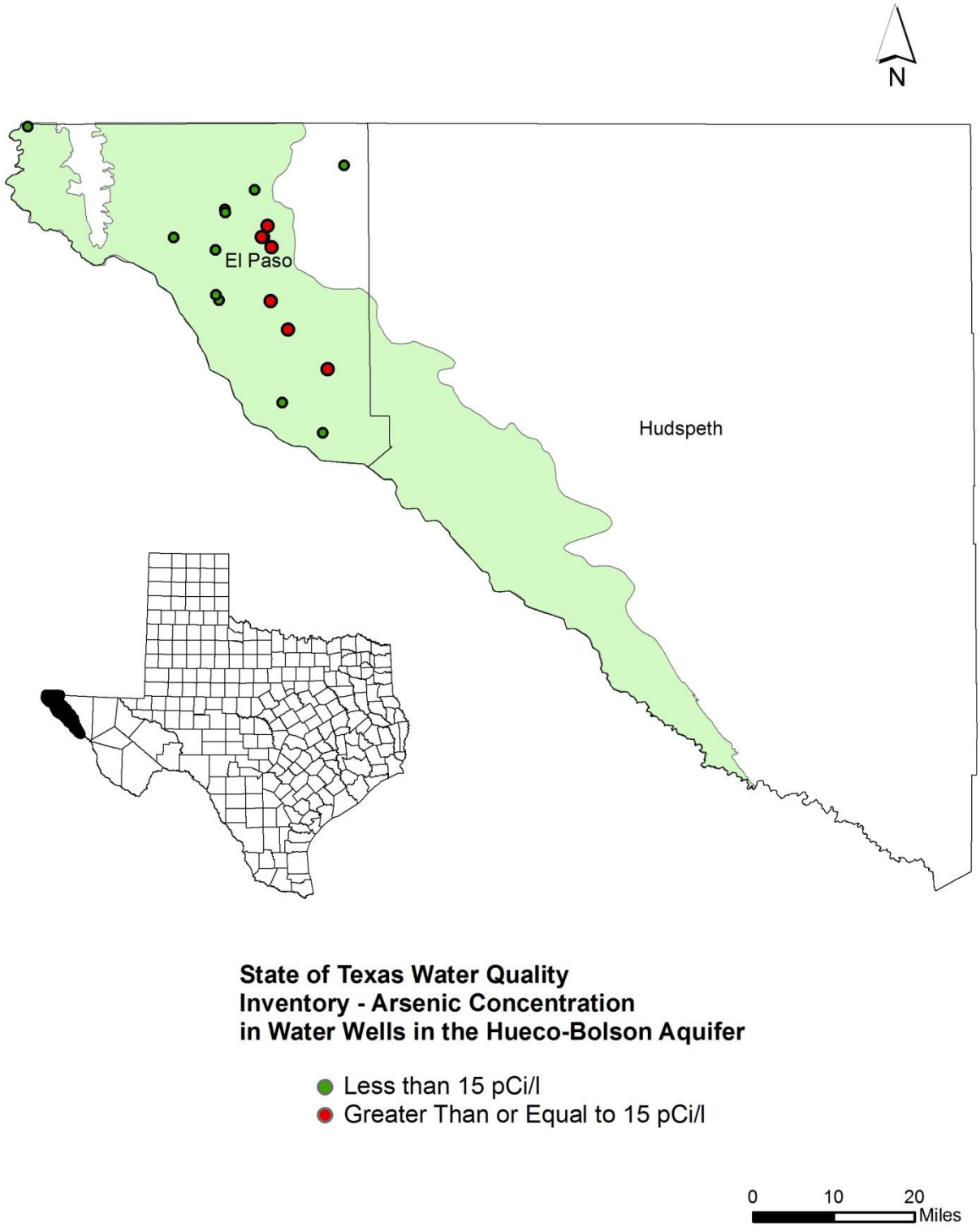


Figure 25. Distribution of Nitrate in the Lipan Aquifer

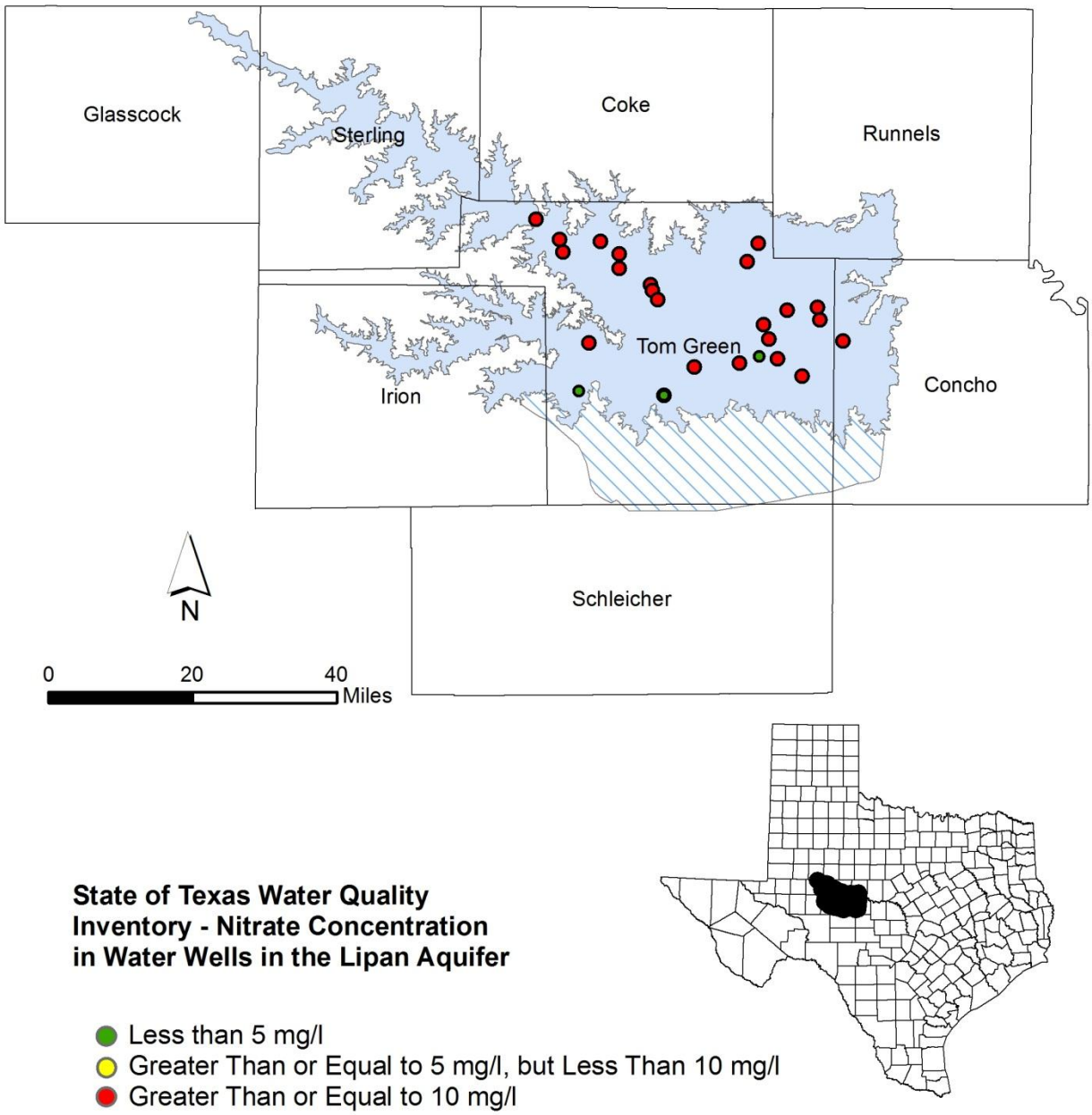


Figure 26. Distribution of Total Dissolved Solids in the Lipan Aquifer

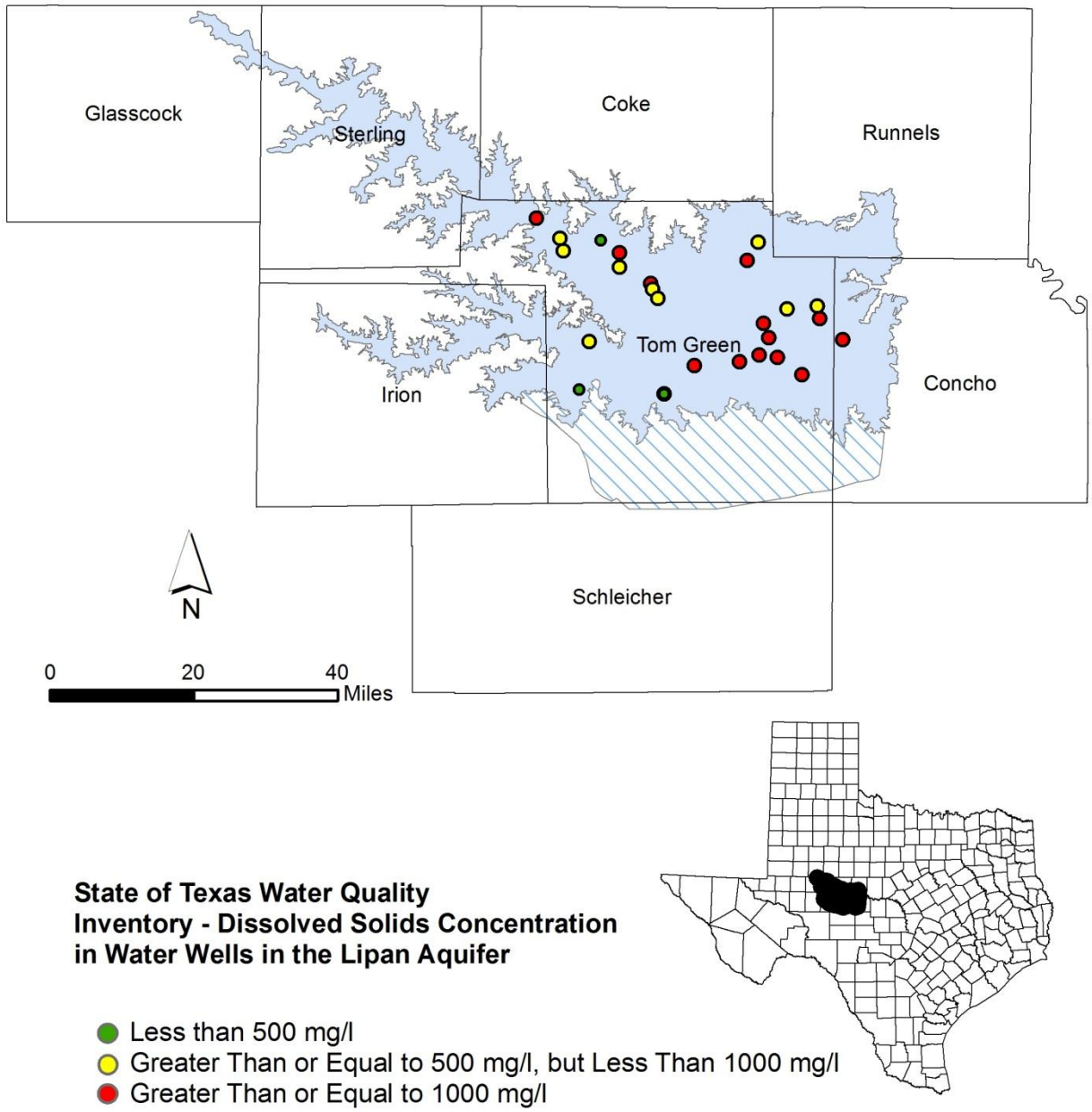


Figure 27. Distribution of Arsenic in the Ogallala Aquifer

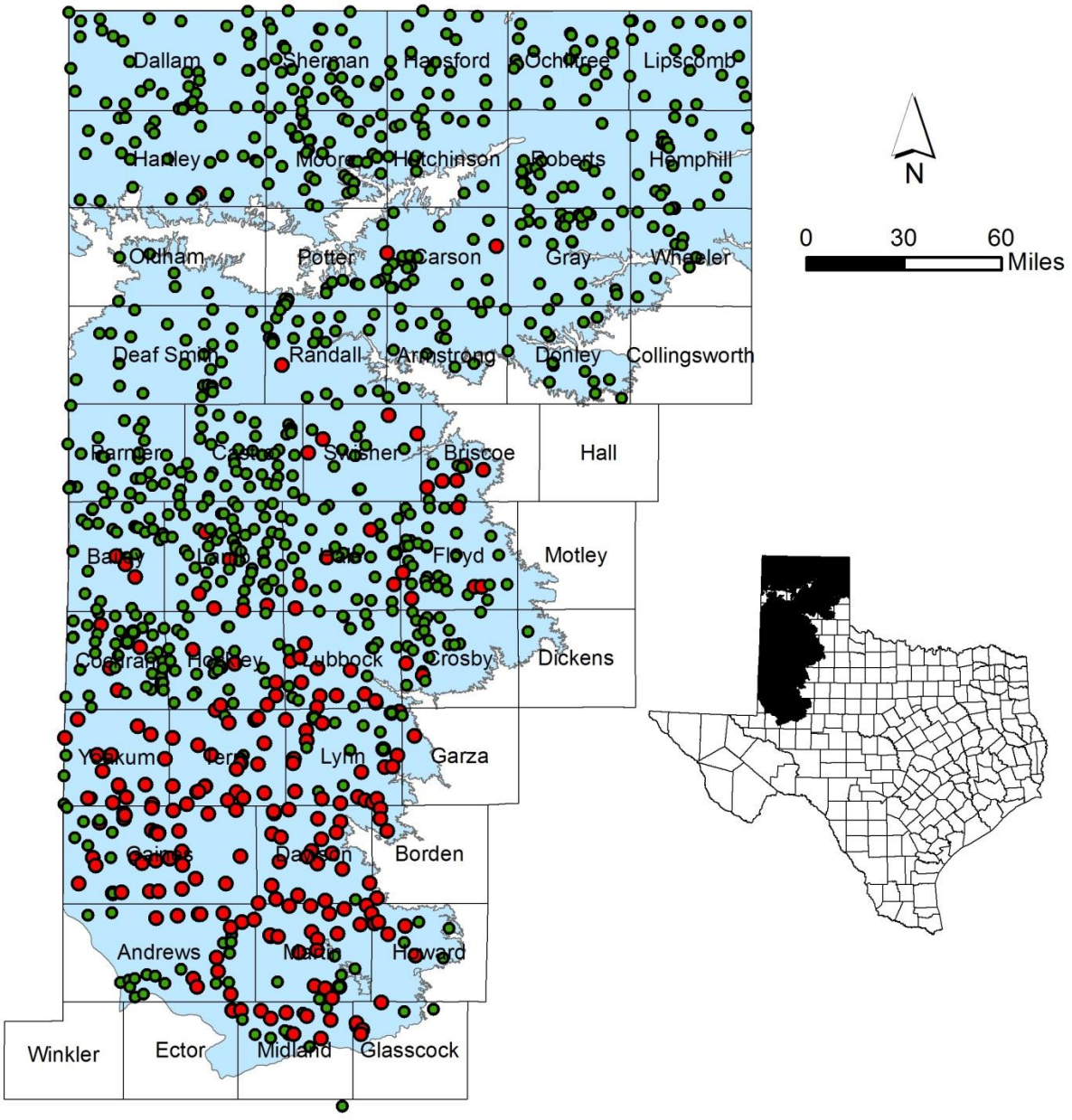


Figure 28. Distribution of Fluoride in the Ogallala Aquifer

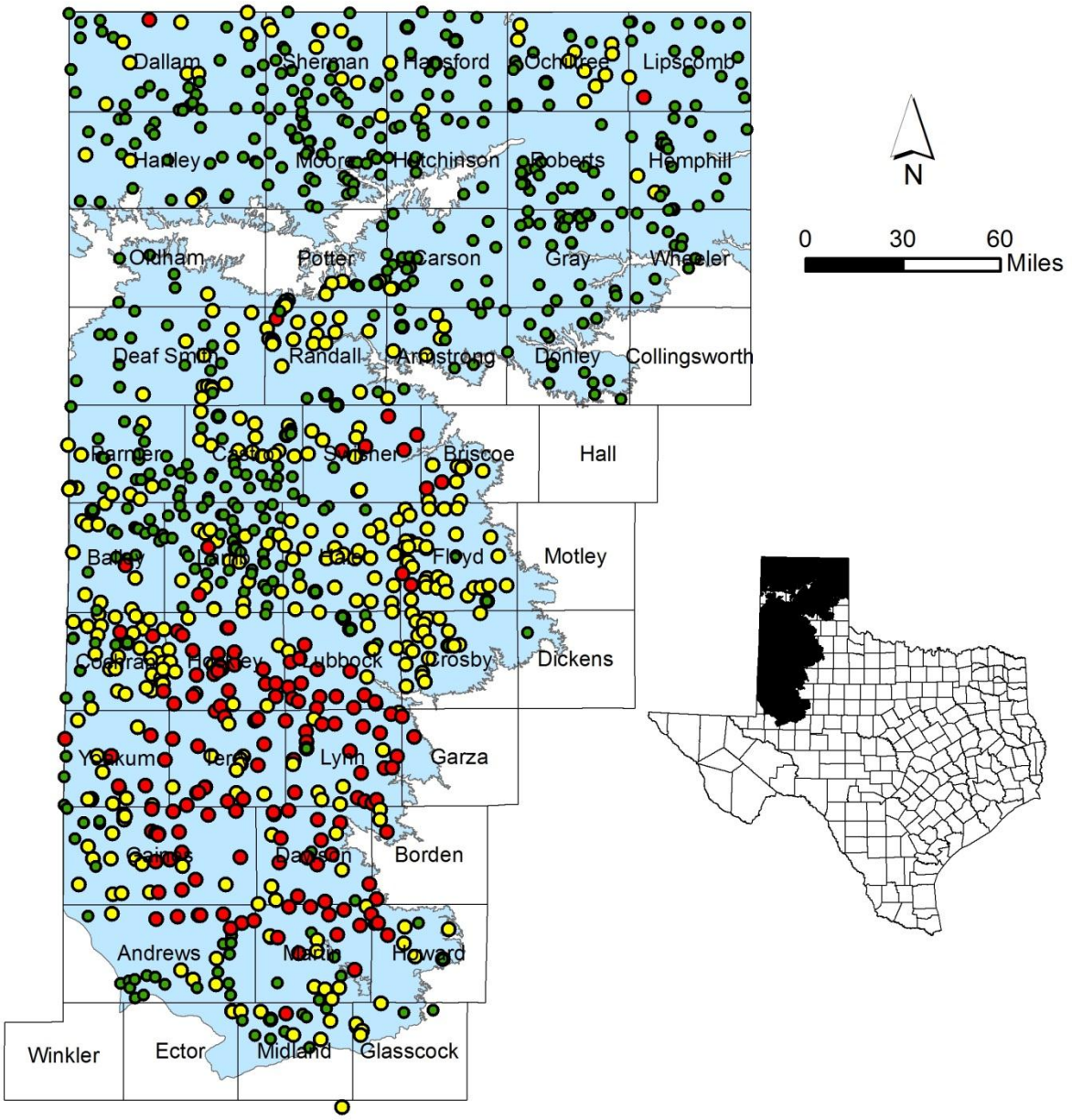
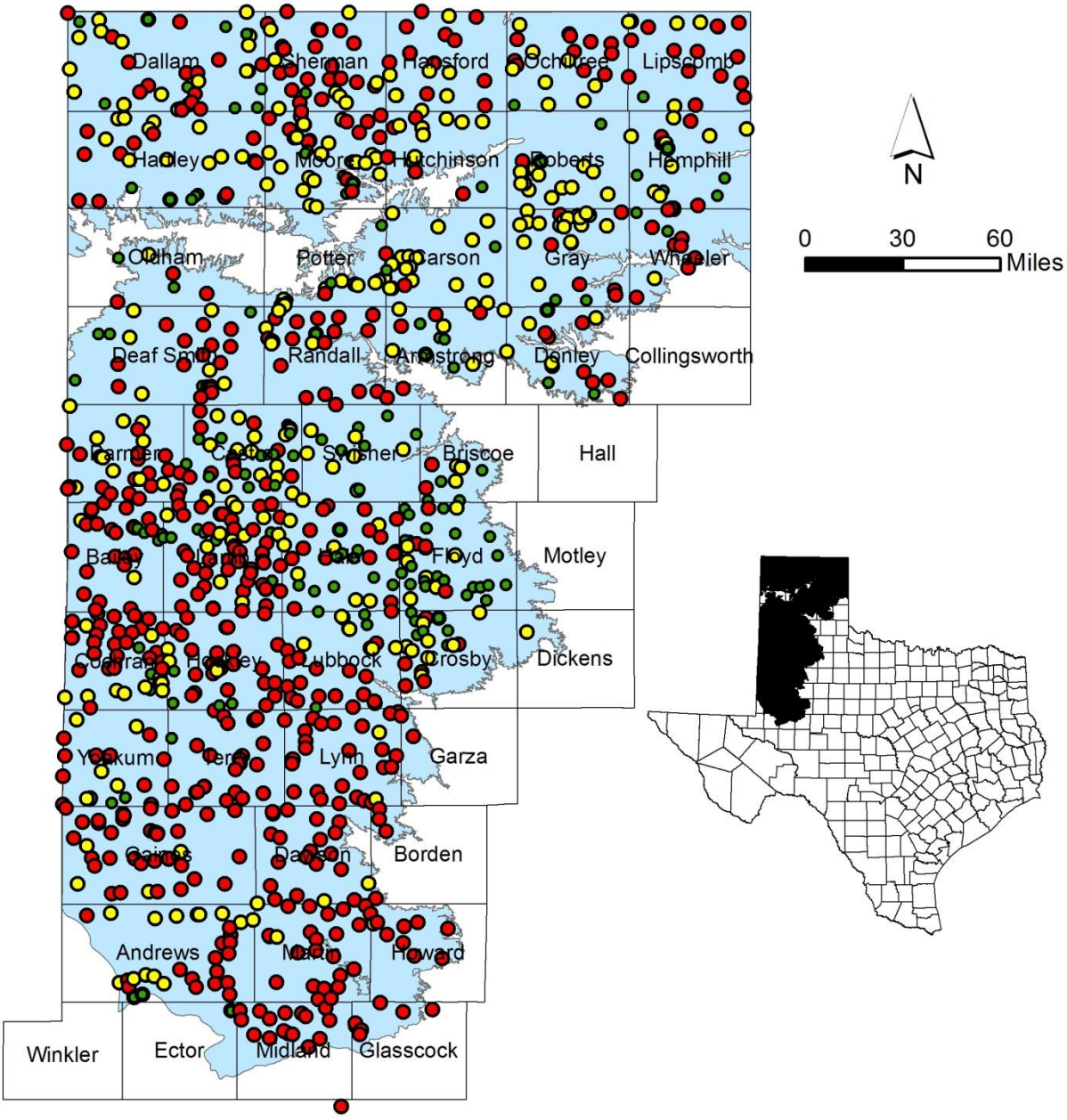


Figure 29. Distribution of Nitrate in the Ogallala Aquifer



State of Texas Water Quality Inventory - Nitrate Concentration in Water Wells in the Ogallala Aquifer

- Less than 5 mg/l
- Greater Than or Equal to 5 mg/l, but Less Than 10 mg/l
- Greater Than or Equal to 10 mg/l

Figure 30. Distribution of Total Dissolved Solids in the Ogallala Aquifer

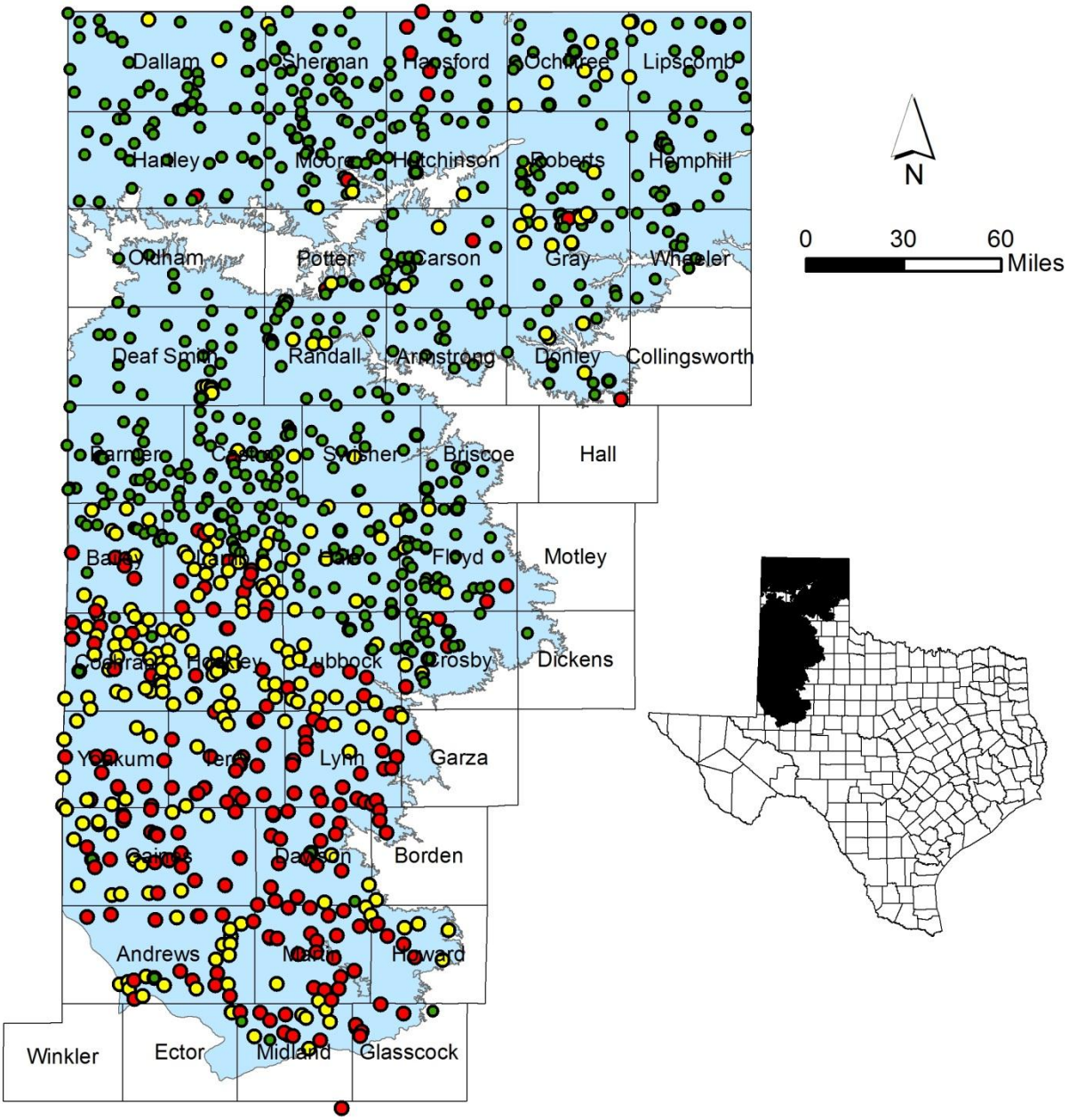


Figure 31. Distribution of Nitrate in the Pecos Valley Aquifer

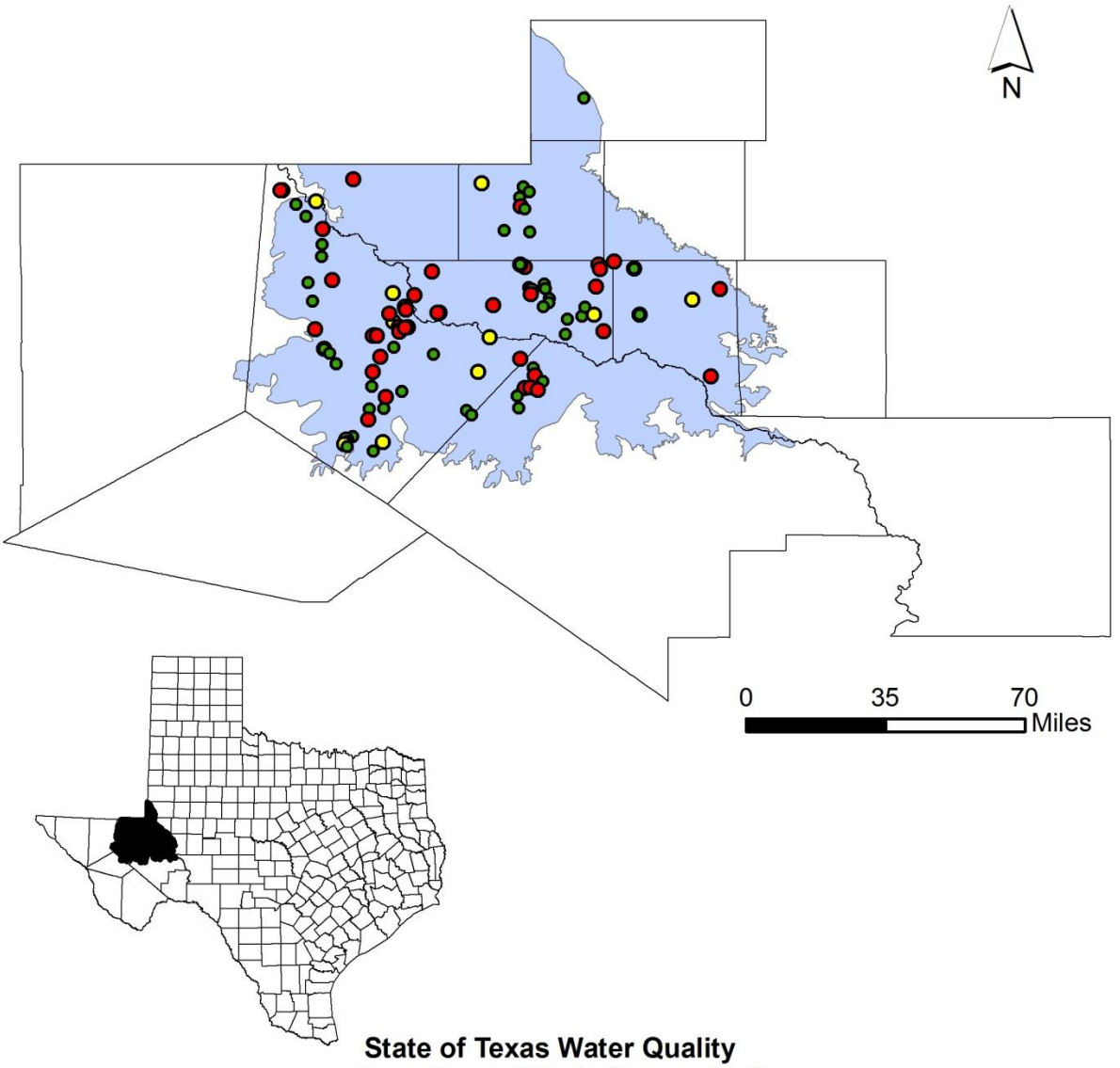
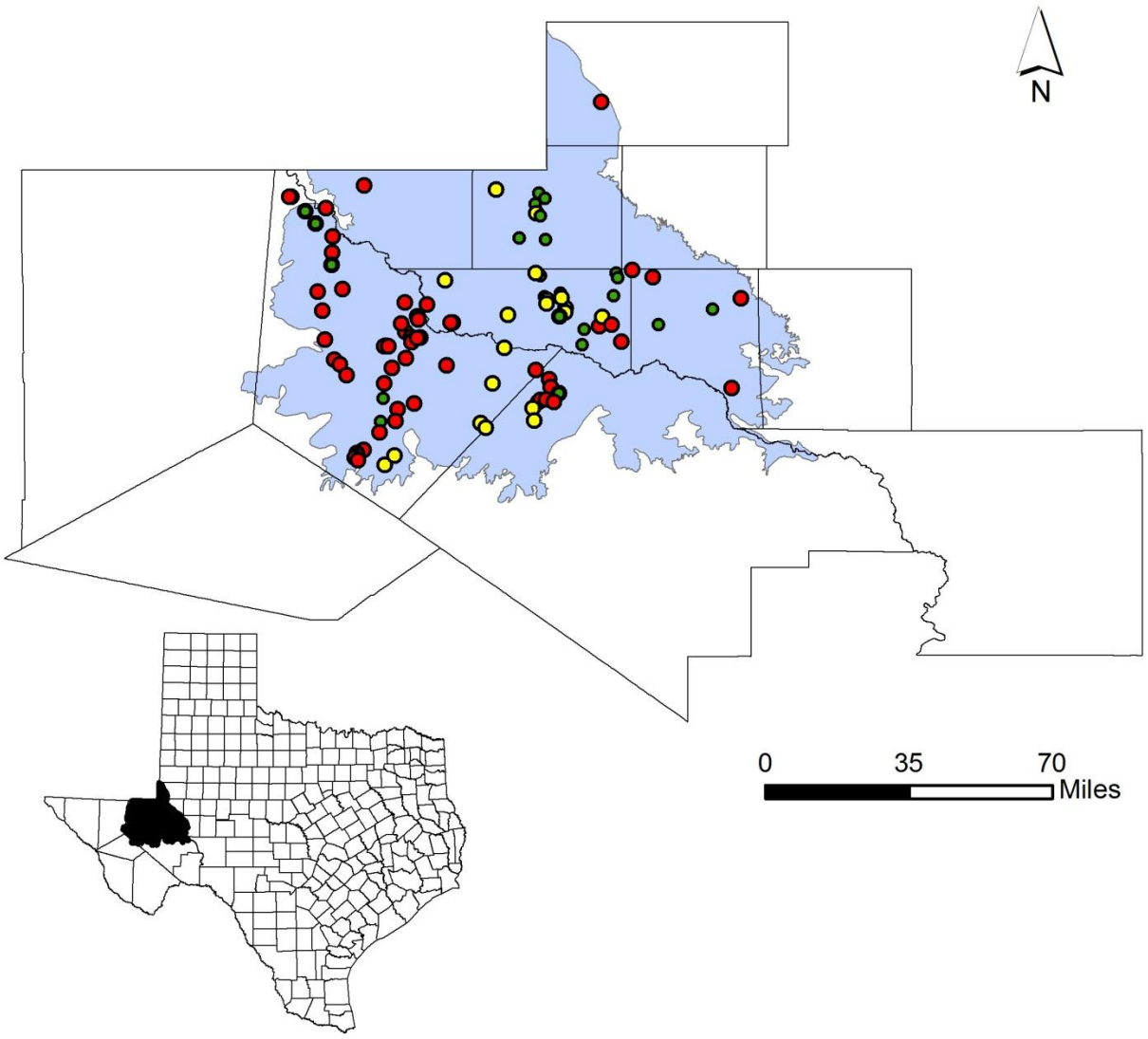


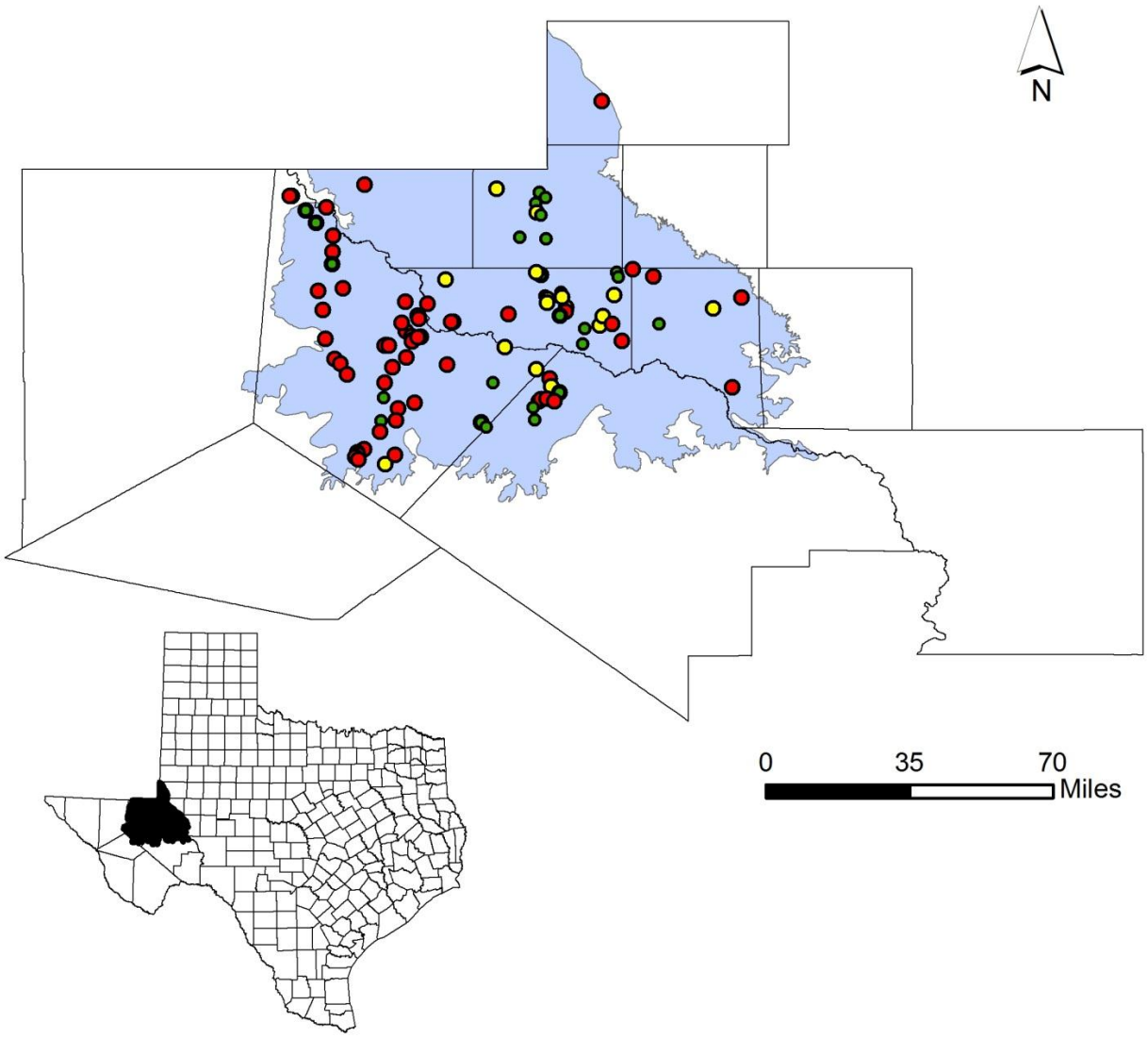
Figure 32. Distribution of Sulfate in the Pecos Valley Aquifer



State of Texas Water Quality Inventory - Sulfate Concentration in Water Wells in the Pecos Valley Aquifer

- Less than 100 mg/l
- Greater Than or Equal to 100 mg/l, but Less Than 300 mg/l
- Greater Than or Equal to 300 mg/l

Figure 33. Distribution of Total Dissolved Solids in the Pecos Valley Aquifer



State of Texas Water Quality Inventory - Dissolved Solids Concentration in Water Wells in the Pecos Valley Aquifer

- Less than 500 mg/l
- Greater Than or Equal to 500 mg/l, but Less Than 1000 mg/l
- Greater Than or Equal to 1000 mg/l

Figure 34. Distribution of Nitrate in the Seymour Aquifer

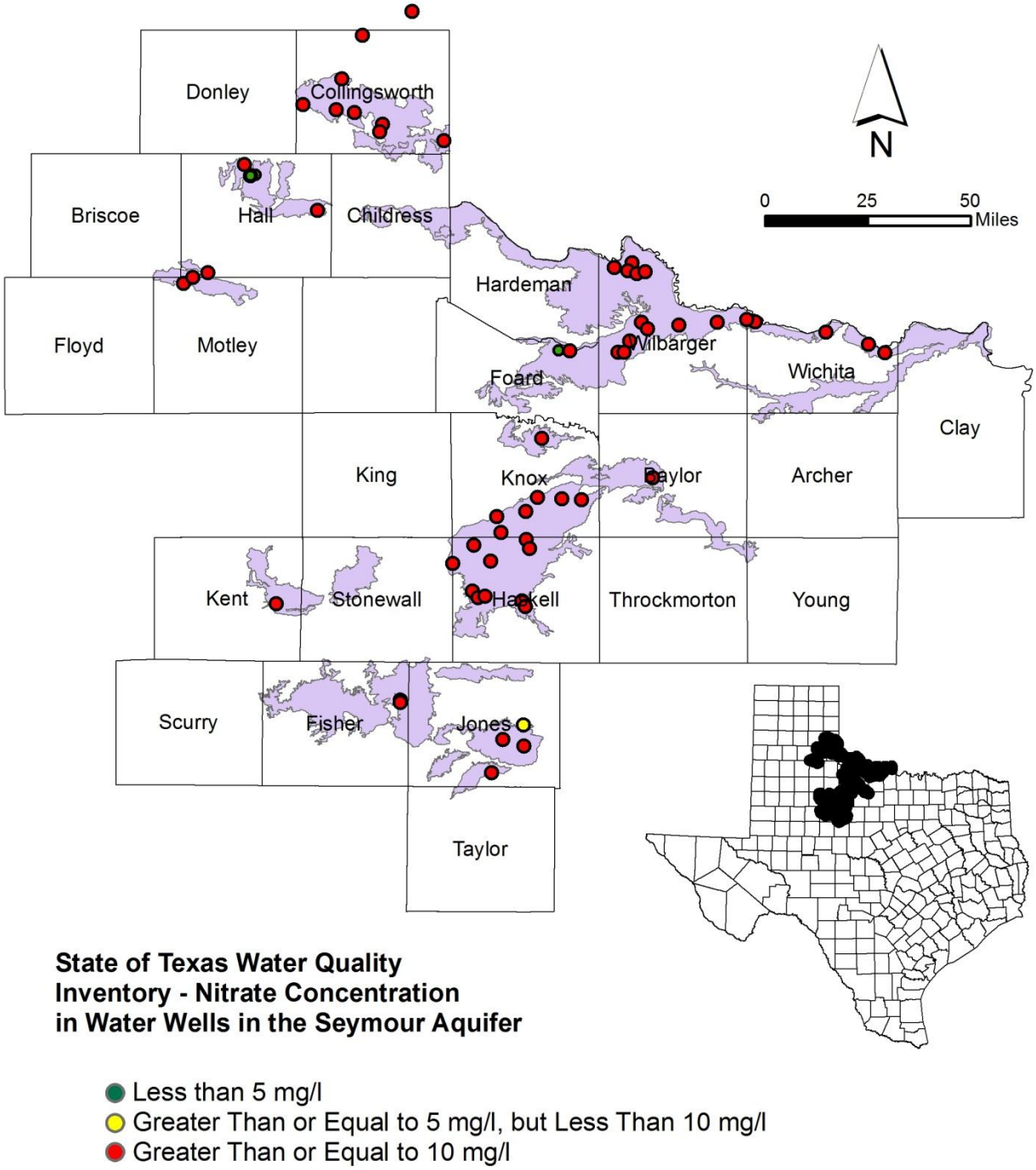


Figure 35. Distribution of Total Dissolved Solids in the Seymour Aquifer

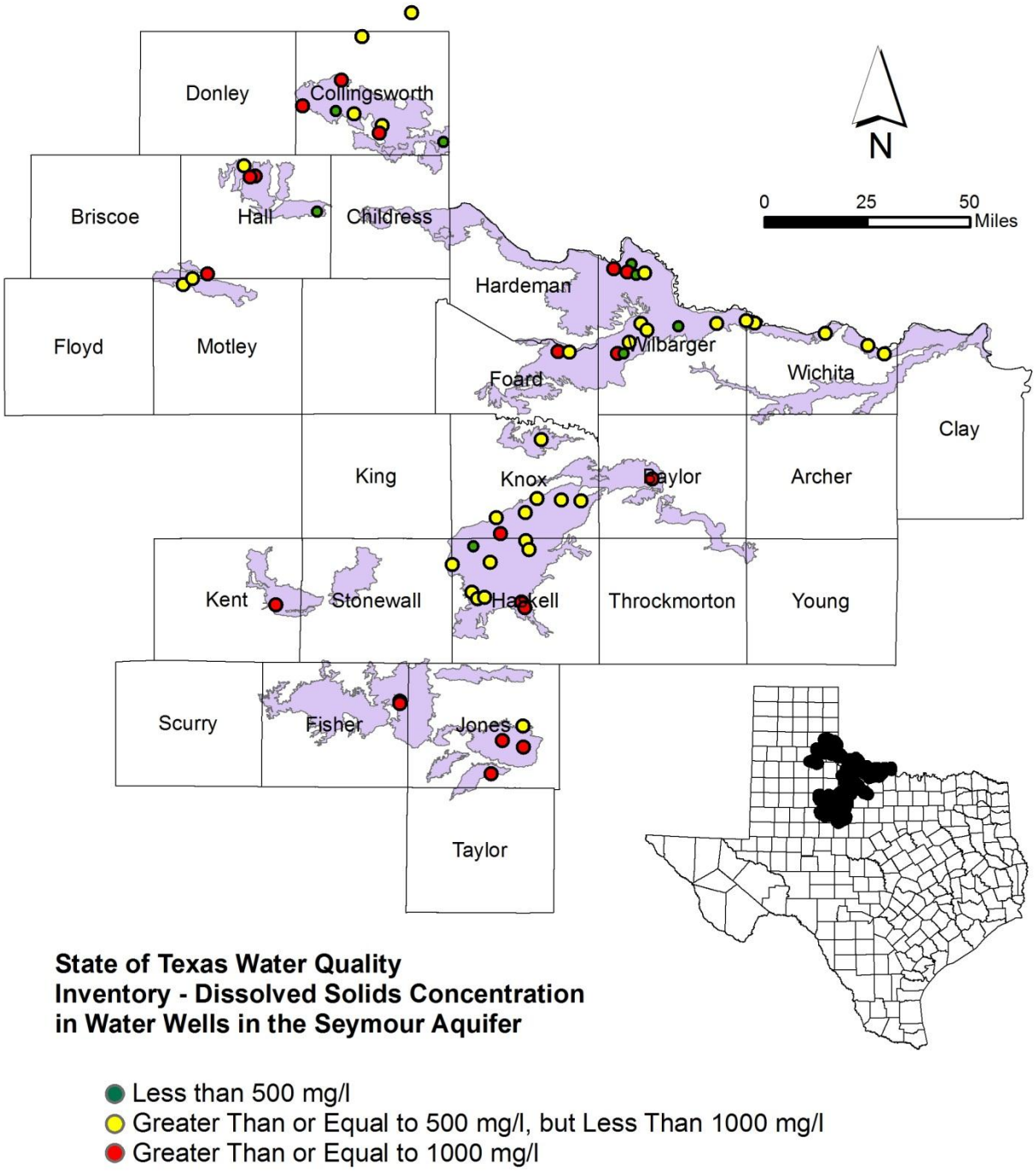


Figure 36. Distribution of Fluoride in the Trinity Aquifer

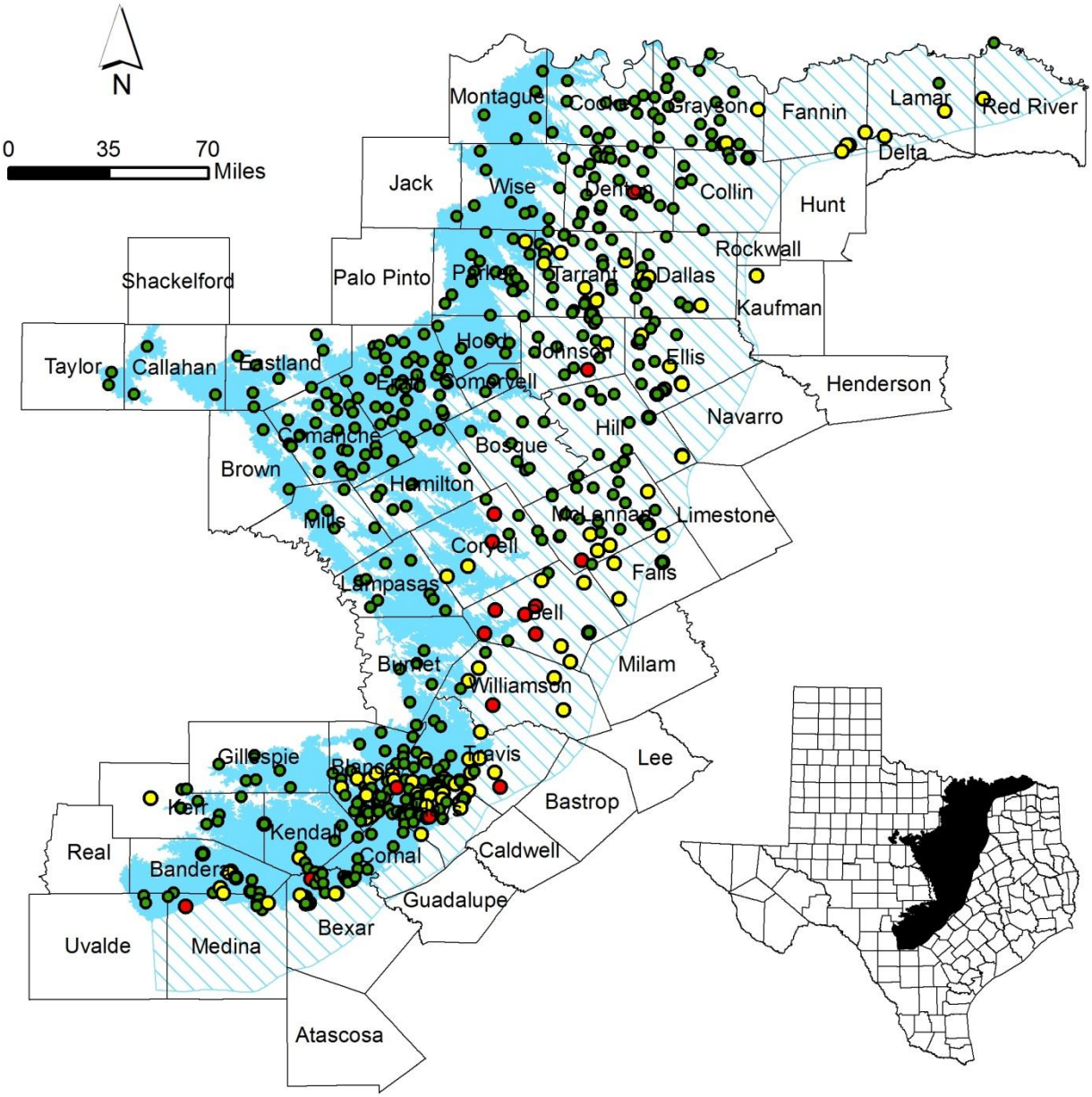


Figure 37. Distribution of Nitrate in the Trinity Aquifer

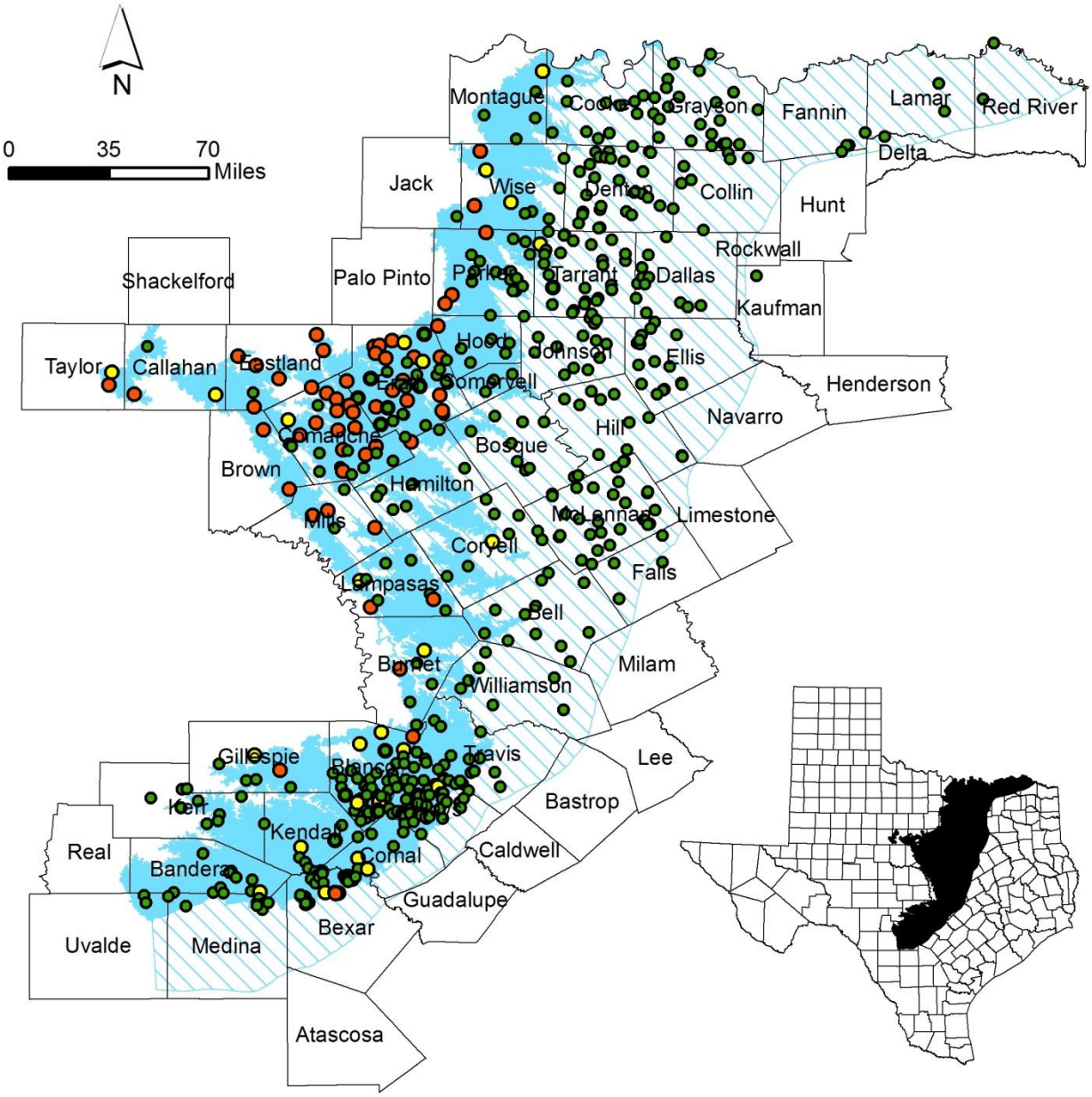


Figure 38. Distribution of Total Dissolved Solids in the Trinity Aquifer

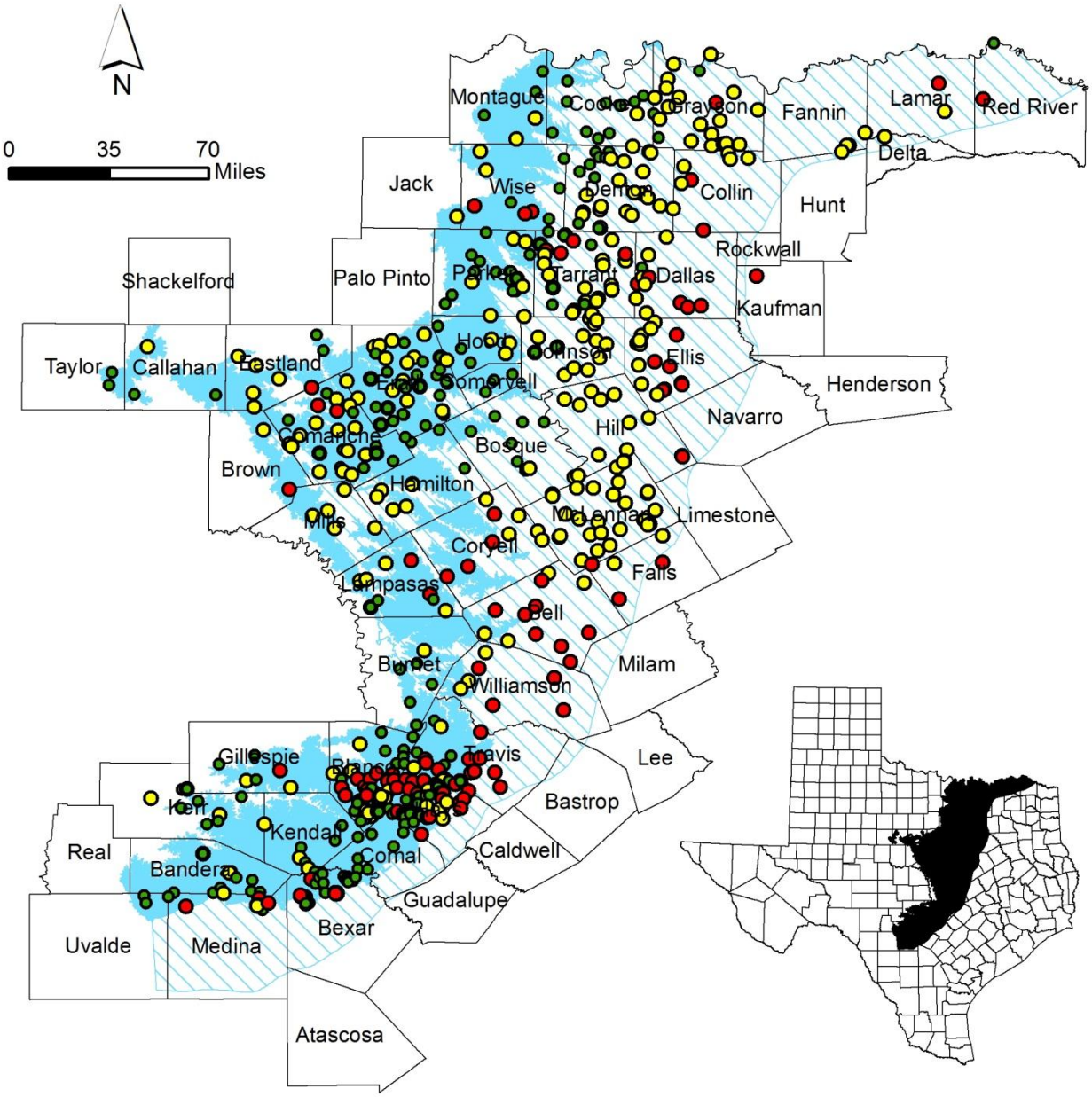


Figure 39. Distribution of Arsenic in the West Texas Bolsons Aquifer

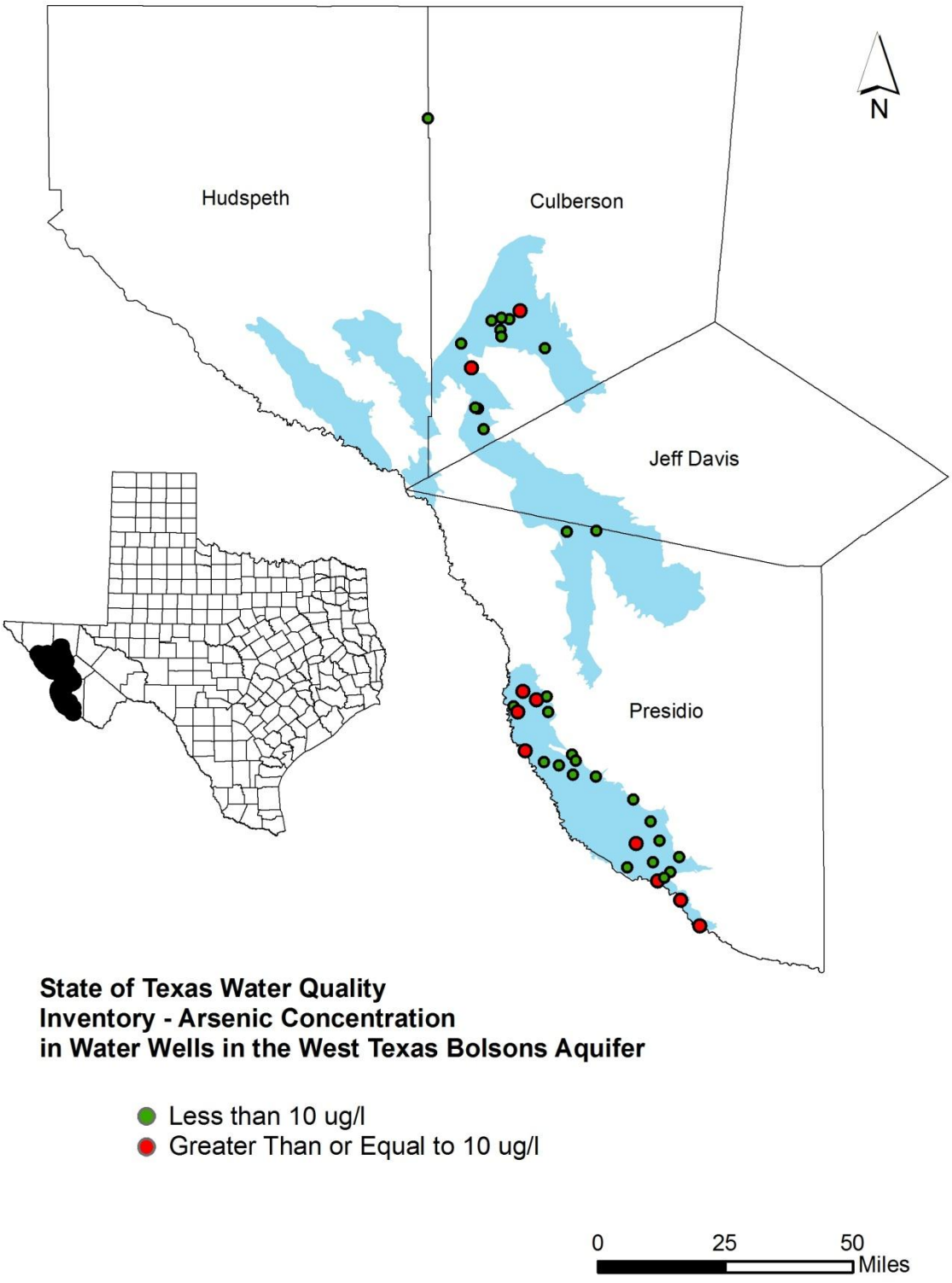


Figure 40. Distribution of Nitrate in the West Texas Bolsons Aquifer